










# Industrial Automation Occupations

## Labor Market Analysis: San Diego County

September 2022

### Summary

NEW PROGRAM RECOMMENDATION?	EVIDENCE OF A SUPPLY GAP?	AT OR ABOVE THE LIVING WAGE?	EXPECTED EDUCATION FOR MAJORITY OF OCCUPATIONS ANALYZED
 <p><b>Proceed with New Program</b></p>	 	 	<input type="checkbox"/> Bachelor's Degree+ <input type="checkbox"/> Associate Degree <input type="checkbox"/> Some College or Certificate <input checked="" type="checkbox"/> HS Diploma or Equivalent <input type="checkbox"/> Less than a HS Diploma <input type="checkbox"/> Apprenticeship
SUPPORT FOR PROGRAM MODIFICATION?	NUMBER OF INSTITUTIONS THAT PROVIDE TRAINING	NUMBER OF ANNUAL JOB OPENINGS	
 	<p>MEDIUM</p> 	<p>HIGH</p> 	

This brief provides labor market information about *Industrial Automation Occupations* to assist the San Diego and Imperial Counties Community Colleges with program development and strategic planning. *Industrial Automation Occupations* include “Electrical and Electronic Engineering Technologists and Technicians,” “First-Line Supervisors of Production and Operating Workers,” “Industrial Engineering Technologists and Technicians,” “Industrial Machinery Mechanics,” and “Maintenance and Repair Workers, General.” According to available labor market information, *Industrial Automation Occupations* in San Diego County have a labor market demand of 2,438 annual job openings (while average demand for a single occupation in San Diego County is 245 annual job openings), and nine institutions supply 186 awards for these occupations, suggesting that there is a supply gap in the labor market. Entry-level and median wages are above the living wage. This brief recommends proceeding with developing a new program and supports a program modification because 1) there is a supply gap in the region; 2) there is a high number of annual job openings; and 3) entry-level and median wages are above the living wage.

## Introduction

This report provides labor market information in San Diego County for the following occupational codes in the Standard Occupational Classification (SOC)<sup>1</sup> system:

- **Electrical and Electronic Engineering Technologists and Technicians (SOC 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.
- **First-Line Supervisors of Production and Operating Workers (SOC 51-1011):** Directly supervise and coordinate the activities of production and operating workers, such as inspectors, precision workers, machine setters and operators, assemblers, fabricators, and plant and system operators.
- **Industrial Engineering Technologists and Technicians (SOC 17-3026):** Apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May perform time and motion studies on worker operations in a variety of industries for purposes such as establishing standard production rates or improving efficiency.
- **Industrial Machinery Mechanics (SOC 49-9041):** Repair, install, adjust, or maintain industrial production and processing machinery or refinery and pipeline distribution systems. May also install, dismantle, or move machinery and heavy equipment according to plans.
- **Maintenance and Repair Workers, General (SOC 49-9071):** Perform work involving the skills of two or more maintenance or craft occupations to keep machines, mechanical equipment, or the structure of a building in repair. Duties may involve pipe fitting; HVAC maintenance; insulating; welding; machining; carpentry; repairing electrical or mechanical equipment; installing, aligning, and balancing new equipment; and repairing buildings, floors, or stairs.

For the purpose of this report, these occupations are referred to as *Industrial Automation Occupations*.

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<sup>1</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](https://www.bls.gov/soc/).

## Projected Occupational Demand

Between 2021 and 2026, *Industrial Automation Occupations* are projected to increase by 423 net jobs or two percent (Exhibit 1a). Employers in San Diego County will need to hire 2,438 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 Industrial Automation Occupations (2011-2026)<sup>2</sup>**

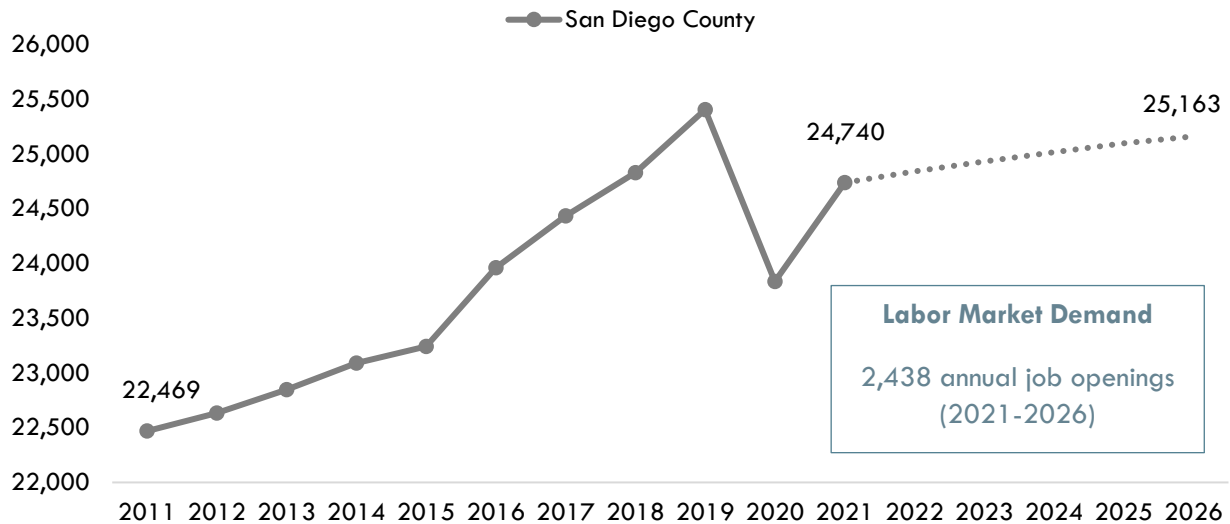


Exhibit 1b disaggregates the projected number of jobs change by occupation. “Maintenance and Repair Workers, General” are projected to have the most labor market demand between 2021 and 2026, with 1,403 annual job openings.

**Exhibit 1b: Number of Jobs for Industrial Automation Occupations in San Diego County (2021-2026)<sup>3</sup>**

Occupational Title	2021 Jobs	2026 Jobs	2021 - 2026 Net Jobs Change	2021- 2026 % Net Jobs Change	Annual Job Openings (Demand)
Maintenance and Repair Workers, General	14,676	14,732	56	0%	1,403
First-Line Supervisors of Production and Operating Workers	4,577	4,690	113	2%	477
Electrical and Electronic Engineering Technologists and Technicians	3,046	3,061	15	0%	288
Industrial Machinery Mechanics	1,982	2,187	205	10%	219
Industrial Engineering Technologists and Technicians	459	493	34	7%	51
<b>Total</b>	<b>24,740</b>	<b>25,163</b>	<b>423</b>	<b>2%</b>	<b>2,438</b>

<sup>2</sup> EMSI 2022.03; QCEW, Non-QCEW, Self-Employed.

<sup>3</sup> EMSI 2022.03; QCEW, Non-QCEW, Self-Employed.

## Earnings

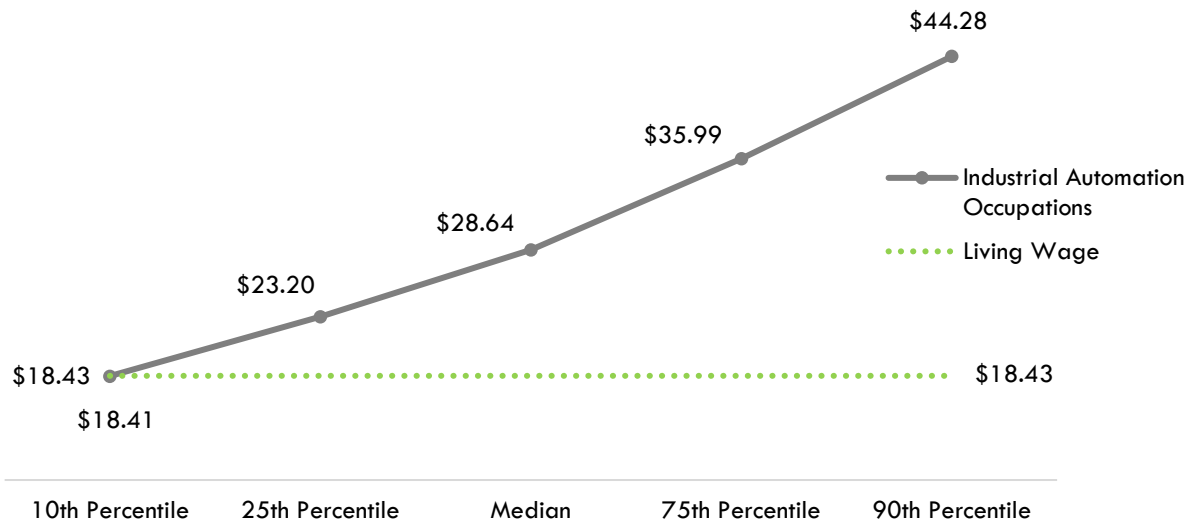
Exhibit 2a disaggregates hourly earnings by occupation. The entry-level hourly earnings for *Industrial Automation Occupations* range from \$17.57 to \$28.88.

**Exhibit 2a: Hourly Earnings for Industrial Automation Occupations in San Diego County<sup>4</sup>**

Occupational Title	Entry-Level Hourly Earnings (25 <sup>th</sup> Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 <sup>th</sup> Percentile)
Electrical and Electronic Engineering Technologists and Technicians	\$28.88	\$31.91	\$41.74
Industrial Engineering Technologists and Technicians	\$23.74	\$29.53	\$37.58
First-Line Supervisors of Production and Operating Workers	\$23.17	\$30.33	\$38.90
Industrial Machinery Mechanics	\$22.66	\$28.99	\$33.26
Maintenance and Repair Workers, General	\$17.57	\$22.43	\$28.47

On average, the entry-level hourly earnings for *Industrial Automation Occupations* are \$23.20; this is more than the living wage for a single adult in San Diego County, which is \$18.43 per hour (Exhibit 2b).<sup>5</sup>

**Exhibit 2b: Average Hourly Earnings<sup>6</sup> for Industrial Automation Occupations in San Diego County<sup>7</sup>**



<sup>4</sup> EMSI 2022.03; QCEW, Non-QCEW, Self-Employed.

<sup>5</sup> "Family Needs Calculator (formerly the California Family Needs Calculator)," Insight: Center for Community Economic Development, last updated 2021. [insightccd.org/family-needs-calculator/](https://insightccd.org/family-needs-calculator/).

<sup>6</sup> 10th and 25th percentiles could be considered entry-level wages, and 75th and 90th percentiles could be considered experienced wages for individuals who may have been in the occupation longer, received more training than others, etc.

<sup>7</sup> EMSI 2022.03; QCEW, Non-QCEW, Self-Employed.

## 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 **nine** TOP codes and **24** CIP codes related to *Industrial Automation Occupations* (Exhibit 3).

**Exhibit 3: Related TOP and CIP Codes for *Industrial Automation Occupations*<sup>9</sup>**

TOP or CIP Code	TOP or CIP Program Title
TOP 0924.00	Engineering Technology, General
TOP 0934.00	Electronics and Electric Technology
TOP 0934.10	Computer Electronics
TOP 0934.20	Industrial Electronics
TOP 0934.40	Electrical Systems and Power Transmission
TOP 0943.00	Instrumentation Technology
TOP 0945.00	Industrial Systems Technology and Maintenance
TOP 0956.00	Manufacturing and Industrial Technology
TOP 0999.00	Other Engineering and Related Industrial Technologies
CIP 15.0000	Engineering Technology, General
CIP 15.0201	Civil Engineering Technology/Technician
CIP 15.0303	Electrical, Electronic and Communications Engineering Technology/Technician
CIP 15.0306	Integrated Circuit Design
CIP 15.0399	Electrical and Electronic Engineering Technologies/Technicians, Other
CIP 15.0404	Instrumentation Technology/Technician
CIP 15.0405	Robotics Technology/Technician
CIP 15.0406	Automation Engineer Technology/Technician
CIP 15.0611	Metallurgical Technology/Technician
CIP 15.0612	Industrial Technology/Technician
CIP 15.0613	Manufacturing Engineering Technology/Technician
CIP 15.0699	Industrial Production Technologies/Technicians, Other
CIP 15.0803	Automotive Engineering Technology/Technician
CIP 15.0805	Mechanical Engineering/Mechanical Technology/Technician

<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> This brief uses a conservative estimate of program supply and only calculates awards from the TOP codes in Exhibit 3.

TOP or CIP Code	TOP or CIP Program Title
CIP 15.1201	Computer Engineering Technology/Technician
CIP 15.1203	Computer Hardware Technology/Technician
CIP 15.9999	Engineering Technologies and Engineering-Related Fields, Other
CIP 46.0301	Electrical and Power Transmission Installation/Installer, General
CIP 47.0101	Electrical/Electronics Equipment Installation and Repair, General
CIP 47.0104	Computer Installation and Repair Technology/Technician
CIP 47.0105	Industrial Electronics Technology/Technician
CIP 47.0199	Electrical/Electronics Maintenance and Repair Technology, Other
CIP 47.0303	Industrial Mechanics and Maintenance Technology
CIP 50.0404	Industrial and Product Design

According to TOP data, three community colleges supply the region with awards for these occupations: San Diego City, San Diego College of Continuing Education, and Southwestern. According to CIP data, six non-community colleges supply the region with awards, California Institute of Arts & Technology, California Institute of Arts & Technology-National City, United Education Institute-Chula Vista, United Education Institute-UEI College San Marcos, National University, and NewSchool of Architecture and Design (Exhibit 4).

**Exhibit 4: Number of Awards (Certificates and Degrees) Conferred by Postsecondary Institutions  
(Program Year 2017-18 through Program Year 2020-21 Average)**

TOP6 or CIP Code	TOP6 or CIP Program Title	3-Yr Annual Average CC Awards (PY18-19 to PY20-21)	Other Educational Institutions 3-Yr Annual Average Awards (PY17-18 to PY19-20)	3-Yr Total Average Supply (PY17-18 to PY20-21)
0934.00	Electronics and Electric Technology	<b>105</b>	<b>0</b>	<b>105</b>
	• San Diego City	1	0	
	• San Diego Continuing Education	104	0	
	• Southwestern	0	0	
0934.10	Computer Electronics	<b>2</b>	<b>0</b>	<b>2</b>
	• San Diego City	2	0	
	• Southwestern	0	0	

TOP6 or CIP Code	TOP6 or CIP Program Title	3-Yr Annual Average CC Awards (PY18-19 to PY20-21)	Other Educational Institutions 3-Yr Annual Average Awards (PY17-18 to PY19-20)	3-Yr Total Average Supply (PY17-18 to PY20-21)
0934.40	Electrical Systems and Power Transmission	<b>29</b>	<b>0</b>	<b>29</b>
	• San Diego City	29	0	
0945.00	Industrial Systems Technology and Maintenance	<b>0</b>	<b>0</b>	<b>0</b>
	• Southwestern	0	0	
0956.00	Manufacturing and Industrial Technology	<b>4</b>	<b>0</b>	<b>4</b>
	• San Diego City	4	0	
0999.00	Other Engineering and Related Industrial Technologies	<b>4</b>	<b>0</b>	<b>4</b>
	• San Diego City	4	0	
15.0000	Engineering Technologies, General	<b>0</b>	<b>1</b>	<b>1</b>
	• National University	0	1	
15.0399	Electrical/Electronic Engineering Technologies/Technicians, Other	<b>0</b>	<b>10</b>	<b>10</b>
	• National University	0	10	
47.0101	Electrical/Electronics Equipment Installation and Repair, General	<b>0</b>	<b>0</b>	<b>0</b>
	• National University	0	0	
47.0104	Computer Installation and Repair Technology/Technician	<b>0</b>	<b>27</b>	<b>27</b>
	• California Institute of Arts & Technology	0	11	
	• California Institute of Arts & Technology-National City	0	3	
	• United Education Institute-Chula Vista	0	6	
	• United Education Institute-UEI College San Marcos	0	7	
50.0404	Industrial and Product Design	<b>0</b>	<b>4</b>	<b>4</b>
	• NewSchool of Architecture and Design	0	4	
			<b>Total</b>	<b>186</b>

## Demand vs. Supply

Comparing labor demand (annual openings) with labor supply<sup>10</sup> suggests that there is a **supply gap** for these occupations in San Diego County, with **2,438** annual openings and **186** awards. Comparatively, there are **26,003** annual openings in California and **2,611** awards, suggesting that there is also a supply gap across the state<sup>11</sup> (Exhibit 5).

**Exhibit 5: Labor Demand (Annual Openings) Compared with Labor Supply (Average Annual Awards)**

	<b>Demand</b> (Annual Openings)	<b>Supply<sup>12</sup></b> (Total Annual Average Supply)	<b>Supply Gap or Oversupply</b>
San Diego	2,438	186	<b>2,252</b>
California	26,003	2,611	<b>23,392</b>

**Please note:** This is a basic analysis of supply and demand of labor. The data does not include workers currently in the labor force who could fill these positions or workers who are not captured by publicly available data. 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.

<sup>10</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.

<sup>11</sup> "Supply and Demand," Centers of Excellence Student Outcomes, [coeccc.net/Supply-and-Demand.aspx](http://coeccc.net/Supply-and-Demand.aspx).

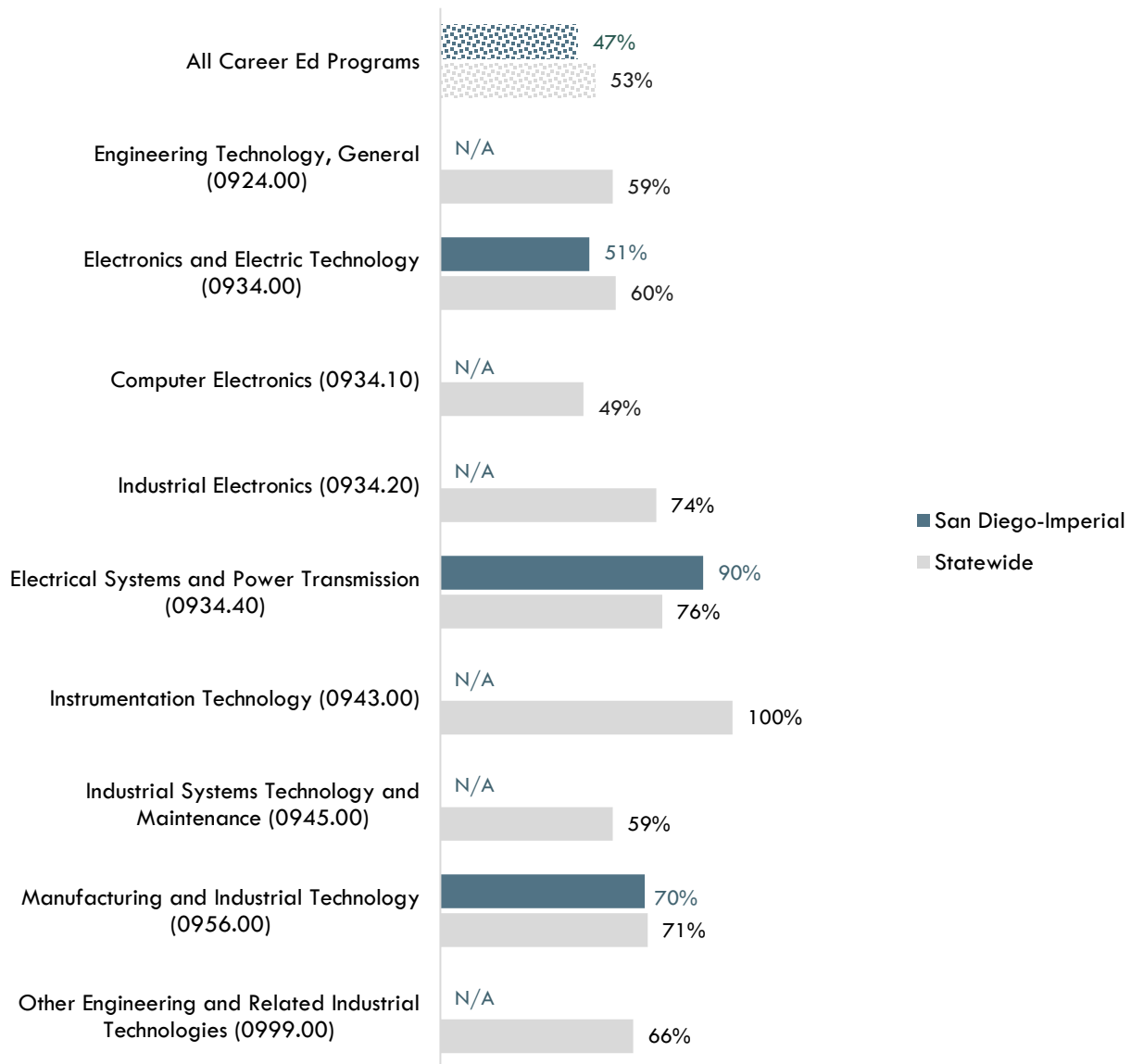
<sup>12</sup> Awards included: associate degree; award <1 year; award 1 <2 years; and postsecondary awards



## Student Outcomes and Regional Comparisons

According to the California Community Colleges LaunchBoard, 51 to 90 percent of students in the San Diego-Imperial region earned a living wage after completing a program related to *Industrial Automation Occupations*, compared 49 to 100 percent statewide and 53 percent of students in Career Education programs in general across the state (Exhibit 6a).<sup>13</sup>

**Exhibit 6a: Percentage of Students Who Earned a Living Wage by Program, PY2018-19<sup>14</sup>**



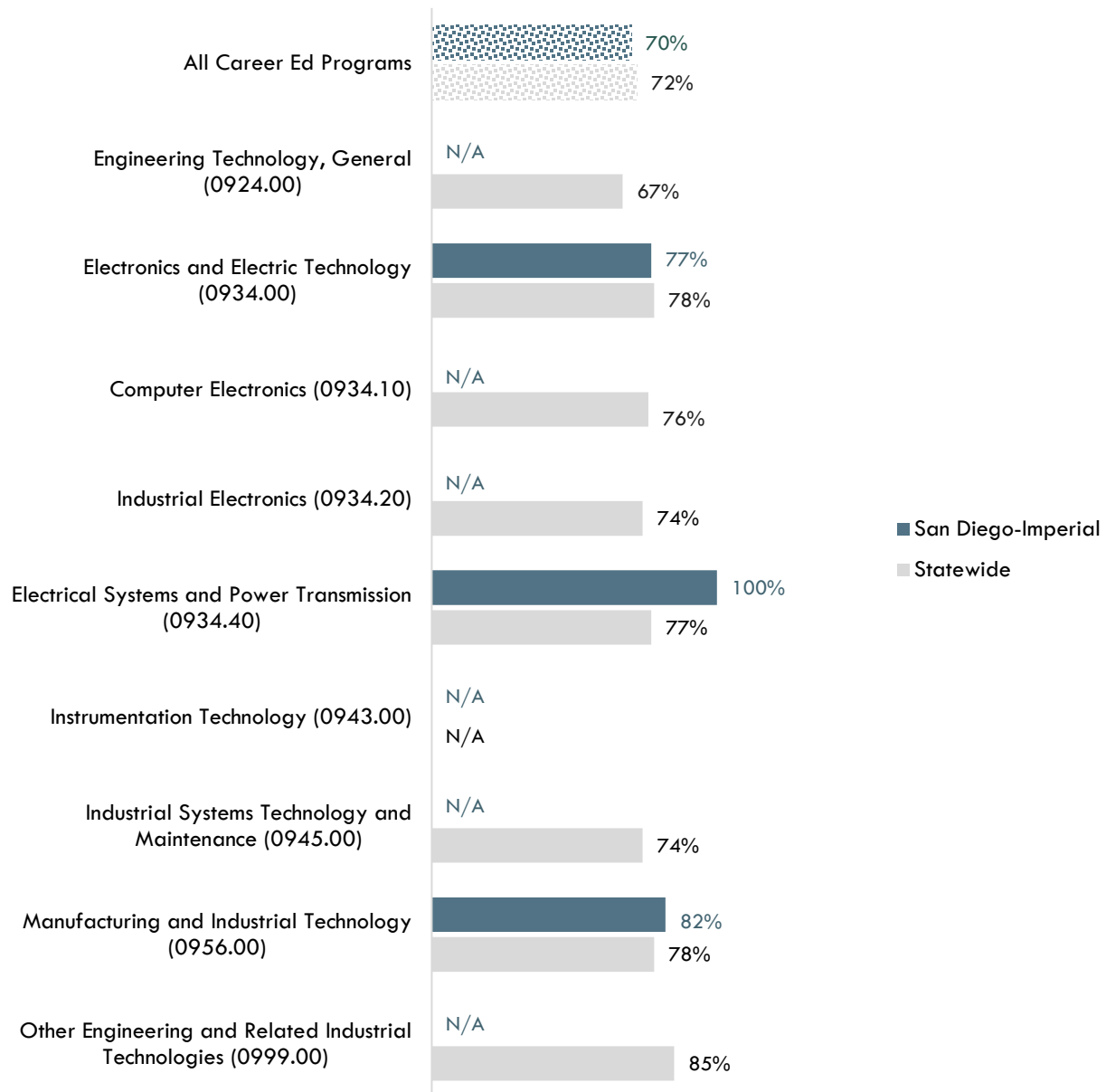
"N/A" indicates insufficient data

<sup>13</sup> "California Community Colleges Strong Workforce Program," California Community Colleges, [calpassplus.org/LaunchBoard/SWP.aspx](http://calpassplus.org/LaunchBoard/SWP.aspx).

<sup>14</sup> Most recent year with available data is Program Year 2018-19. Among completers and skills builders who exited, the percentage of students who attained a living wage.

According to the California Community Colleges LaunchBoard, 77 to 100 percent of students in the San Diego-Imperial region obtained a job closely related to their field of study after completing a program related to *Industrial Automation Occupations*, compared to 67 to 85 percent statewide and 72 percent of students in Career Education programs in general across the state (Exhibit 6b).<sup>15</sup>

**Exhibit 6b: Percentage of Students in a Job Closely Related to Field of Study by Program, PY2017-18<sup>16</sup>**



"N/A" indicates insufficient data

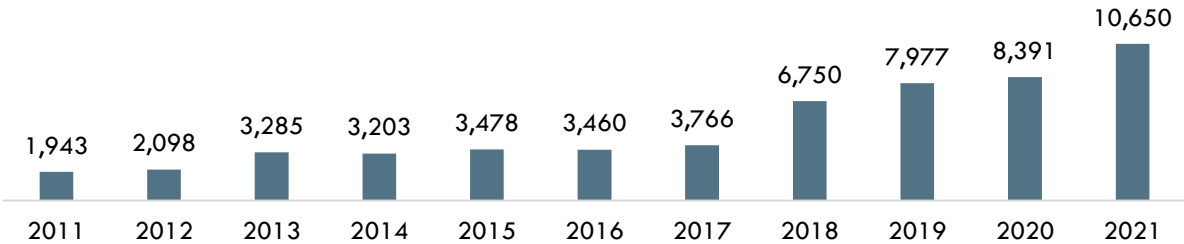
<sup>15</sup> "California Community Colleges Strong Workforce Program," California Community Colleges, [calpassplus.org/LaunchBoard/SWP.aspx](http://calpassplus.org/LaunchBoard/SWP.aspx).

<sup>16</sup> Most recent year with available data is Program Year 2017-18. Percentage of Students in a Job Closely Related to Field of Study: Among students who responded to the CTEOS, the percentage reporting employment in the same or similar field as their program of study.

## Online Job Postings

This report analyzes not only historical and projected (traditional LMI) data, but also recent data from online job postings (real-time LMI). Online job postings may provide additional insight about recent changes in the labor market that are not captured by historical data. Between 2011 and 2021, there was an average of 5,000 online job postings per year for *Industrial Automation Occupations* in San Diego County (Exhibit 7). Please note that online job postings do **not** equal labor market demand; demand is represented by annual job openings (see Exhibit 1 b). Employers may post a position multiple times for various reasons, such as increasing the pool of applicants, for example.

**Exhibit 7: Number of Online Job Postings for Industrial Automation Occupations in San Diego County (2011-2021)<sup>17</sup>**



## Top Employers

Between January 1, 2019 and December 31, 2021, the top five employers in San Diego County for *Industrial Automation Occupations* were [Marriott International Incorporated](#), [General Atomics](#), [Lincoln Property Company](#), [General Dynamics](#), and [The Home Depot Incorporated](#) based on online job postings (Exhibit 8).

**Exhibit 8: Top Employers for Industrial Automation Occupations in San Diego County<sup>18</sup>**

Top Employers	
<ul style="list-style-type: none"> <li>• Marriott International Incorporated</li> <li>• General Atomics</li> <li>• Lincoln Property Company</li> <li>• General Dynamics</li> <li>• The Home Depot Incorporated</li> </ul>	<ul style="list-style-type: none"> <li>• University of California San Diego</li> <li>• McDonald's</li> <li>• CBRE Group</li> <li>• CONAM Management Corporation</li> <li>• Northrop Grumman</li> </ul>

<sup>17</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2011-2021.

<sup>18</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2019-2021.

## Education, Skills, and Certifications

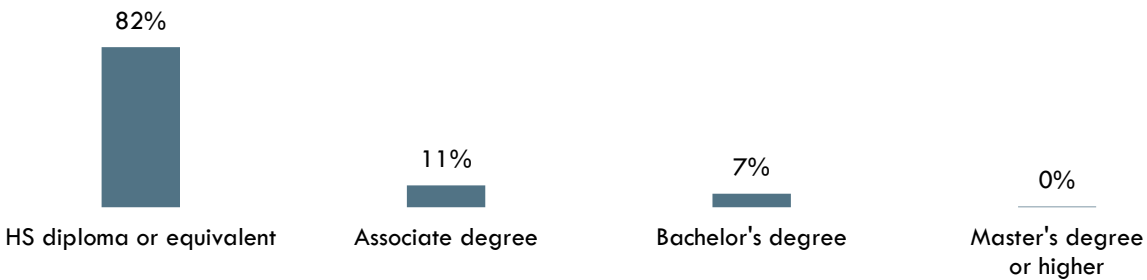
*Industrial Automation Occupations* have a national educational attainment ranging from a [high school diploma or equivalent](#) to an [associate degree](#) (Exhibit 9a).

**Exhibit 9a: National Educational Attainment for *Industrial Automation Occupations*<sup>19</sup>**

Occupational Title	Typical Entry-Level Education
Electrical and Electronic Engineering Technologists and Technicians	Associate degree
Industrial Engineering Technologists and Technicians	Associate degree
First-Line Supervisors of Production and Operating Workers	High school diploma or equivalent
Industrial Machinery Mechanics	High school diploma or equivalent
Maintenance and Repair Workers, General	High school diploma or equivalent

Based on online job postings between January 1, 2019 and December 31, 2021 in San Diego County, employers posted a [high school diploma or vocational training](#) as the educational requirement for *Industrial Automation Occupations* (Exhibit 9b).<sup>20</sup>

**Exhibit 9b: Educational Requirements for *Industrial Automation Occupations* in San Diego County<sup>21</sup>**



<sup>19</sup> EMSI 2022.03; QCEW, Non-QCEW, Self-Employed.

<sup>20</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2019-2021.

<sup>21</sup> "Educational Attainment for Workers 25 Years and Older by Detailed Occupation," Bureau of Labor Statistics, last modified April 9, 2021. [bls.gov/emp/tables/educational-attainment.htm](https://bls.gov/emp/tables/educational-attainment.htm).

Exhibit 10 lists the top specialized, soft, and software skills that appeared in online job postings between January 1, 2019 and December 31, 2021.

**Exhibit 10: Top Skills for *Industrial Automation Occupations* in San Diego County<sup>22</sup>**

Specialized Skills	Soft Skills	Software Skills
<ul style="list-style-type: none"> <li>• Repair</li> <li>• Plumbing</li> <li>• HVAC</li> <li>• Painting</li> <li>• Predictive / Preventative Maintenance</li> <li>• Carpentry</li> <li>• Customer Service</li> <li>• Cleaning</li> <li>• Scheduling</li> <li>• Power Tools</li> <li>• Hand Tools</li> <li>• Machinery</li> <li>• Drywall</li> <li>• Schematic Diagrams</li> <li>• Lifting Ability</li> </ul>	<ul style="list-style-type: none"> <li>• Troubleshooting</li> <li>• Communication Skills</li> <li>• Preventive Maintenance</li> <li>• Physical Abilities</li> <li>• Computer Literacy</li> <li>• Organizational Skills</li> <li>• Problem Solving</li> <li>• Detail-Oriented</li> <li>• Teamwork / Collaboration</li> <li>• English</li> <li>• Writing</li> <li>• Planning</li> <li>• Written Communication</li> <li>• Multi-Tasking</li> <li>• Time Management</li> </ul>	<ul style="list-style-type: none"> <li>• Microsoft Excel</li> <li>• Microsoft Word</li> <li>• Microsoft PowerPoint</li> <li>• Microsoft Outlook</li> <li>• Enterprise Resource Planning (ERP)</li> <li>• SAP</li> <li>• Word Processing</li> <li>• Lockout / Tagout (LOTO)</li> <li>• Microsoft Access</li> <li>• Microsoft Operating Systems</li> <li>• Linux</li> <li>• Debugging</li> <li>• Function generator</li> <li>• Facebook</li> <li>• Salesforce</li> </ul>

<sup>22</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2019-2021.

Exhibit 11 lists the top certification that appeared in online job postings between January 1, 2019 and December 31, 2021.

**Exhibit 11: Top Certification for *Industrial Automation Occupations* in San Diego County<sup>23</sup>**

Top Certification in Online Job Postings

1. Security Clearance
  2. Environmental Protection Agency Certification
  3. OSHA Forklift Certification
  4. EPA CFC/HCFC Certification
  5. First Aid CPR AED
  6. Occupational Safety and Health Administration Certification
  7. CDL Class C
  8. Automotive Service Excellence (ASE) Certification
  9. CompTIA Security+
  10. CDL Class B
  11. Certified Pool/Spa Operator
  12. CDL Class A
  13. EPA 608
  14. Appliance Repair Certificate
  15. Boiler Operator License
- 

<sup>23</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2019-2021.

Prepared by:

Tina Ngo Bartel, Director ([tngobartel@miracosta.edu](mailto:tngobartel@miracosta.edu))

John Edwards, Research Analyst ([jedwards@miracosta.edu](mailto:jedwards@miracosta.edu))

San Diego-Imperial Center of Excellence for Labor Market Research



### 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.

This workforce demand report uses state and federal job projection data that was developed before the economic impact of COVID-19. The COE is monitoring the situation and will provide more information as it becomes available. Please consult with local employers to understand their current employment needs.