

March 2022

Labor Market Analysis

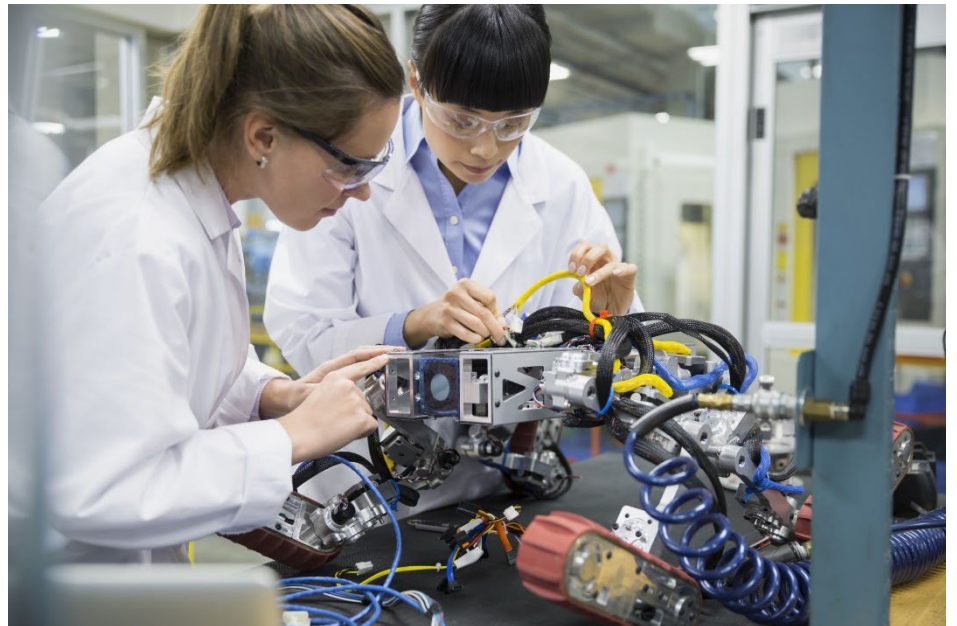
Machinery Maintenance Apprenticeship



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Prepared by the Central Valley/Mother Lode Center of Excellence

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COVID-19 Statement: This report includes employment projection data by Emsi. Emsi’s projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy during the projection period will be at approximately full employment or potential output. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, they may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Other measures such as unemployment rates and monthly industry employment estimates will reflect the most recent information on employment and jobs in the state and, in combination with input from local employers, may help validate current and future employment needs as depicted here.

If for any reason this document is not accessible or if you have specific needs for readability, please contact us and we will do our utmost to accommodate you with a modified version. To make a request, contact Nora Seronello by phone at (209) 575-6894 or by email seronellon@mjc.edu.

Summary

Please note the COVID-19 statement on page 2 when considering this report's findings.

This study conducted by the Central Valley/Mother Lode Center of Excellence examines labor market demand, wages, skills, and postsecondary supply for machinery maintenance. Three occupations related to machinery maintenance were identified for Modesto Junior College:

- 49-2094, Electrical and Electronics Repairers, Commercial and Industrial Equipment
- 49-9041, Industrial Machinery Mechanics
- 49-9043, Maintenance Workers, Machinery

Key findings:

- **Occupational demand** — Nearly 2,500 workers were employed in jobs related to machinery maintenance in 2020 in the North Central Valley/Northern Mother Lode (NCV/NML) subregion. The largest occupation is industrial machinery mechanics with 1,977 workers, a projected growth rate of 13% over the next five years with 229 annual openings.
- **Wages** — Electrical and electronics repairers, commercial and industrial equipment earn the highest entry-level wage, \$23.77/hour in the subregion.
- **Employers** — Employers with the most job postings in the subregion are PepsiCo Inc., Silgan Holdings, and AT&T
- **Occupational titles** — The most common occupational title in job postings in the subregion is industrial machinery mechanics. The most common job title is maintenance mechanic.
- **Skills and certifications** — The top baseline skill is troubleshooting, the top specialized skill is repair, and the top software skill is Microsoft Excel. The most in-demand certification is a driver's license.
- **Education** — A high school diploma or equivalent is typically required for industrial machinery mechanics and maintenance workers, machinery. A postsecondary nondegree award is typically required for electrical and electronics repairers, commercial and industrial equipment
- **Supply** — Analysis of postsecondary completions shows that on average 427 awards were conferred in the Central Valley/Mother Lode region each year.

Based on a comparison of occupational demand and supply, there is an undersupply of 272 trained workers in the subregion and 200 workers in the region. The Center of Excellence recommends that Modesto Junior College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of machinery maintenance workers in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Modesto Junior College to provide labor market information for machinery maintenance. The geographical focus for this report is the North Central Valley/Northern Mother Lode (NCV/NML) subregion, but regional demand and supply data has been included for broader applicability and use. The average living wage for a single adult in the NCV/NML subregion is \$12.65/hour.¹ Analysis of the program and occupational data related to machinery maintenance resulted in the identification of applicable occupations. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

- 49-2094, Electrical and Electronics Repairers, Commercial and Industrial Equipment
- 49-9041, Industrial Machinery Mechanics
- 49-9043, Maintenance Workers, Machinery

The occupational titles, job descriptions, sample job titles, and knowledge and skills from the Bureau of Labor Statistics and O*NET OnLine are shown below.

Electrical and Electronics Repairers, Commercial and Industrial Equipment

Job Description: Repair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas.

Knowledge: Computers and Electronics, Mechanical, Production and Processing, Customer and Personal Service, Mathematics

Skills: Operations Monitoring, Repairing, Critical Thinking, Equipment Maintenance, Quality Control Analysis

Industrial Machinery Mechanics

Job Description: 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.

Knowledge: Mechanical, English Language, Production and Processing, Engineering and Technology, Design

Skills: Equipment Maintenance, Operation and Control, Operations Monitoring, Repairing, Troubleshooting

Maintenance Workers, Machinery

Job Description: Lubricate machinery, change parts, or perform other routine machinery maintenance.

Knowledge: Mechanical, Mathematics, Design, English Language, Engineering and Technology

Skills: Equipment Maintenance, Operations Monitoring, Repairing, Troubleshooting, Operations and Control

¹ The term "living wage" in Center of Excellence reports is calculated by averaging the self-sufficiency wages from the Insight Center's California Family Needs Calculator for each county in the subregion: <https://insightccd.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

Occupational Demand

The NCV/NML subregion employed 2,451 machinery maintenance workers in 2020 (Exhibit 1). The largest occupation is industrial machinery mechanics with 1,977 employed. This occupation is projected to grow by 13% over the next five years and has the greatest number of projected annual openings, 229.

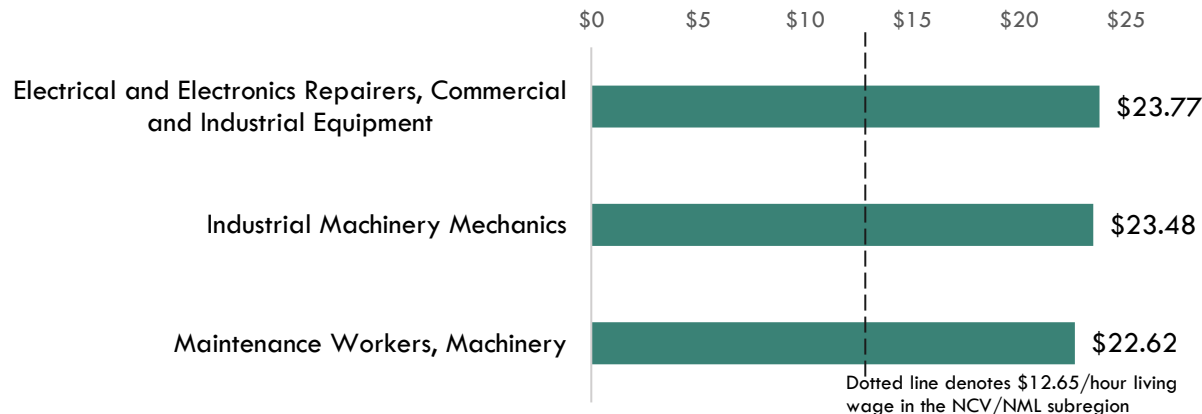
Exhibit 1. Machinery maintenance employment and occupational projections in the NCV/NML subregion

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
Industrial Machinery Mechanics	1,977	2,236	259	13%	229
Maintenance Workers, Machinery	264	295	31	12%	31
Electrical and Electronics Repairers, Commercial and Industrial Equipment	210	226	16	8%	20
TOTAL	2,451	2,757	306	12%	280

Wages

Exhibit 2 shows the entry-level hourly wages of the machinery maintenance occupations. Electrical and electronics repairers, commercial and industrial equipment earn the highest entry-level wage, \$23.77/hour in the subregion².

Exhibit 2. Machinery maintenance entry-level wages in the NCV/NML subregion



Job Postings

There were 179 job postings for the three occupations in the NCV/NML subregion from September 2021 to February 2022.³ The employers with the most job postings are listed in Exhibit 3.

² Entry-level wages are derived from the 25th percentile.

³ Other than occupation titles and job titles, the categories below can be counted one or multiple times per job posting, and across several areas in a single posting. For example, a skill can be counted in two different skill types, and an employer can indicate more than one education level.

Exhibit 3. Top employers of machinery maintenance by number of job postings

Employer	Job Postings	% Job Postings
PepsiCo Inc.	9	6%
Silgan Holdings	8	6%
AT&T	6	4%
Aramark	6	4%
Basalite	6	4%
Leprino Foods Company	6	4%
Medline Industries	6	4%
Basalite Concrete Products Llc	4	3%
Constellation Brands Incorporated	4	3%
Dart Container	4	3%

Exhibit 4 shows how job postings for the targeted occupations in the NCV/NML subregion are distributed across two O*NET OnLine occupations. The occupational title Industrial Machinery Mechanics is listed in 175 job postings. Note how this occupational title dominates the job posting results. Common job titles in postings include Maintenance Mechanic in 36 job postings, Mechanic in 16 job postings, and Outside Plant Technician in 10 job postings.

Exhibit 4. Top occupational titles in job postings for machinery maintenance

Occupational Title	Job Postings	% of Job Postings
Industrial Machinery Mechanics	175	98%
Maintenance Workers, Machinery	4	2%

Salaries

Exhibit 5 shows the “Market Salaries” for machinery maintenance occupations. These are calculated by Burning Glass using a machine learning model built off of millions of job postings every year. This accounts for adjustments based on locations, industry, skills, experience, education requirements, among other variables.

Exhibit 5. Salaries for machinery maintenance occupations

Market Salary Percentile	Salary Amount
10th Percentile	\$35,647
25th Percentile	\$37,542
50th Percentile	\$42,383
75th Percentile	\$47,516
90th Percentile	\$55,722

Education

Of the 179 job postings, 86 listed an education level preferred for the positions being filled. Among those, 91% requested high school or vocational training, and 15% requested an associate degree (Exhibit 6). A job posting can indicate more than one education level. Hence, the percentages shown in the chart below may total more than 100%.

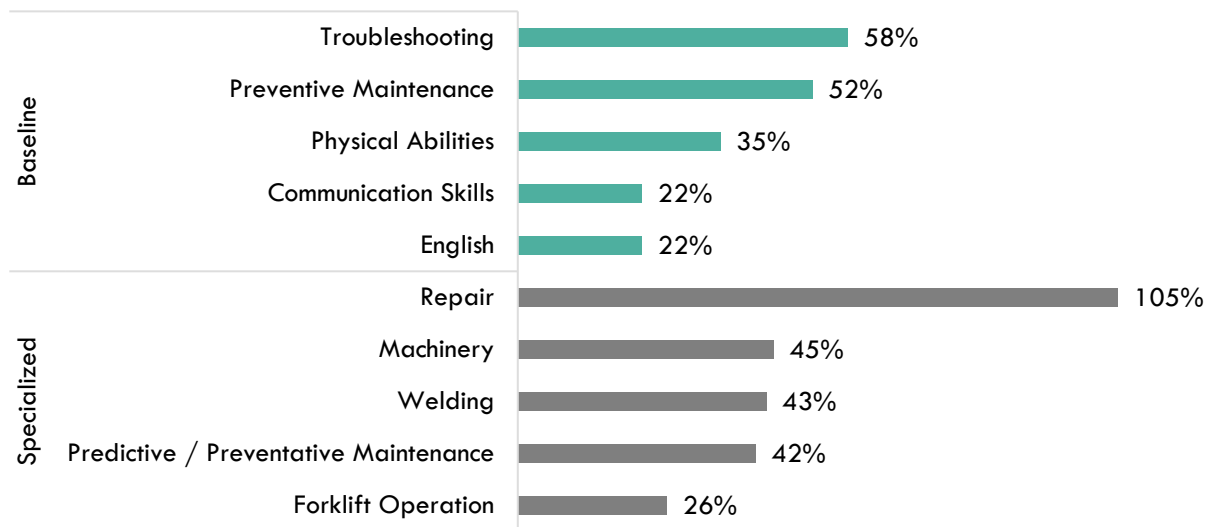
Exhibit 6. Education levels requested in job postings for machinery maintenance

Education Level	Job Postings	% of Job Postings
High school or vocational training	78	91%
Associate's degree	13	15%
Bachelor's degree	1	1%

Baseline and Specialized Skills

Exhibit 7 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are troubleshooting, 58% of job postings, preventive maintenance, 52%, and physical abilities, 35%. The top three specialized skills are repair, 105% of job postings, machinery, 45%, and welding, 43%.

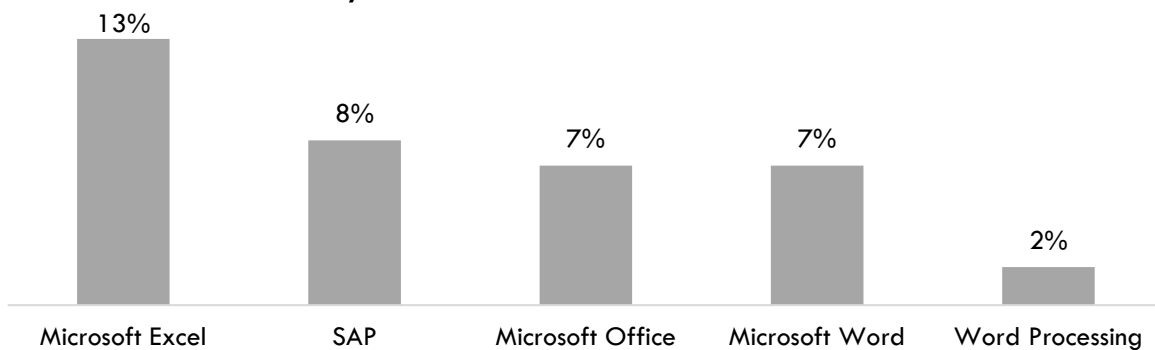
Exhibit 7. In-demand machinery maintenance baseline and specialized skills



Software Skills

Analysis also included the software skills most in demand by employers. Microsoft Excel and SAP were the top two software skills identified in job postings (Exhibit 8).

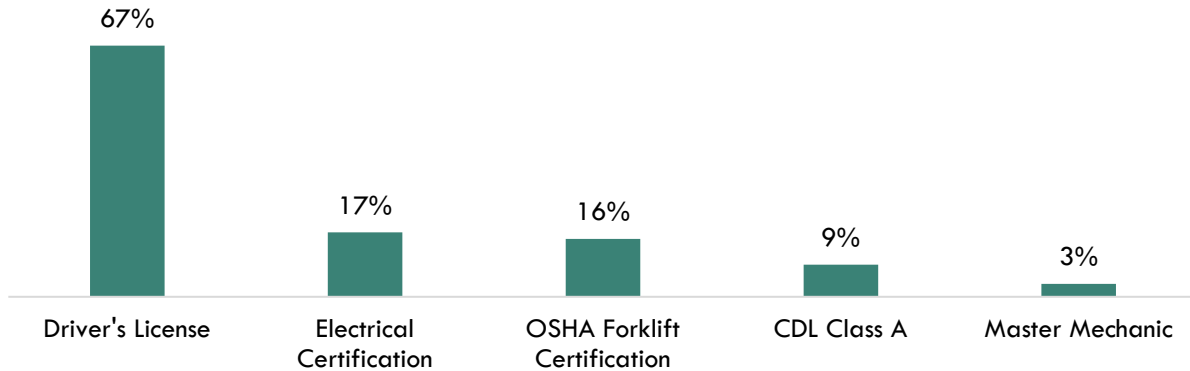
Exhibit 8. In-demand machinery maintenance software skills



Certifications

Of the 179 job postings, 58 contained certification data. Among those, 67% indicated a need for a driver's license. The next top certifications are Electrical Certification and OSHA Forklift Certification (Exhibit 9).

Exhibit 9. Top machinery maintenance certifications requested in job postings



Education, Work Experience & Training

A high school diploma or equivalent is typically required for industrial machinery mechanics and maintenance workers, machinery. A postsecondary nondegree award is typically required for electrical and electronics repairers, commercial and industrial equipment (Exhibit 10).

Exhibit 10. Education, work experience, training, and Current Population Survey results for machinery maintenance occupations⁴

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Industrial Machinery Mechanics	High school diploma or equivalent	None	Long-term	40.9%
Maintenance Workers, Machinery	High school diploma or equivalent	None	Long-term	30.2%
Electrical and Electronics Repairers, Commercial and Industrial Equipment	Postsecondary nondegree award	None	Long-term	44.4%

⁴ "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, <https://www.bls.gov/cps/>.

Supply

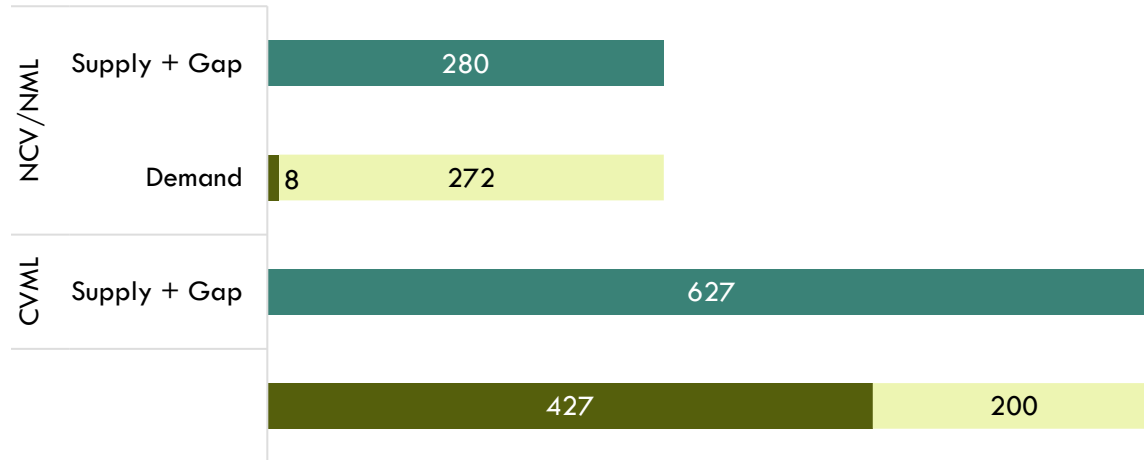
Analysis of program data from the Integrated Postsecondary Education Data System (IPEDS) included the TOP and CIP codes and titles: 094500 - Industrial Systems Technology and Maintenance, 095600 - Manufacturing and Industrial Technology, 15.0613 - Manufacturing Engineering Technology/Technician, and 47.0303 - Industrial Mechanics and Maintenance Technology. Analysis of the last three years of data shows that, on average, 427 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 11).

Exhibit 11. Postsecondary supply for machinery maintenance occupations in the region

TOP/CIP Code- Title	College	Associate Degree	Award 1 < 2 Academic Years	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 6 < 18 Semester Units	Certificate 8 < 16 Semester Units	Credit Award, < 6 Semester Units	Noncredit Award 192 < 288 Hours	Noncredit Award 480 < 960 Hours	Subtotal
094500 - Industrial Systems Technology and Maintenance	Clovis	0		0	0							1
	Fresno City			8						31		39
	Merced	1				1						1
	San Joaquin Delta			1	1	1						3
	Sequoias	7		6		51			17			81
	West Hills Lemoore			1								1
095600 - Manufacturing and Industrial Technology	Bakersfield	7				1						7
	Cerro Coso	1				1						2
	Fresno City	2				7					22	31
	Modesto			1	3			0				4
	Porterville			3	11		18					32
Reedley College	1		37	53	1						91	
15.0613 - Manufacturing Engineering Technology/Technician	Milan Institute-Bakersfield West	1	0									1
47.0303 - Industrial Mechanics and Maintenance Technology	San Joaquin Valley College-Visalia	15	117									132
TOTAL		35	117	56	68	62	18	0	17	31	22	427

There is an undersupply of 272 machinery maintenance workers in the NCV/NML subregion and 200 workers in the region (Exhibit 12).

Exhibit 12. Machinery maintenance workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill gap in the NCV/NML subregion and region



Student Outcomes

Exhibit 13 summarizes employment and wage outcomes from the California Community College Chancellor’s Cal-PASS Plus LaunchBoard for the TOP code related to machinery maintenance. Of note, 22 students received a degree or certificate or attained apprenticeship journey status; 75% of students obtained a job closely related to their field of study; 96% had a median change in earnings; and 75% of students attained a living wage.

Exhibit 13. Subregional metrics for the TOP code related to machinery maintenance

Metric	Industrial Systems Technology and Maintenance 094500	Manufacturing and Industrial Technology 095600
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	*	22
Number of Students Who Transferred	*	*
Job Closely Related to Field of Study	60%	75%
Median Change in Earnings	135%	96%
Attained a Living Wage	74%	75%
* denotes data not available.		

Conclusion

The entry-level wages of the three occupations exceed the NCV/NML subregion's average living wage. There were 179 job postings in the past six months for occupations related to machinery maintenance in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is troubleshooting, and the top specialized skill is repair.
- The top software skill is Microsoft Excel.
- The top certification is a driver's license.

There is an undersupply of trained workers, a shortage of 272 in the NCV/NML subregion and 200 in the region.

Recommendation

Based on these findings, it is recommended that Modesto Junior College work with the regional director, the college's advisory board, and local industry in the expansion of programs to address the shortage of machinery maintenance in the region.

Appendix A: Methodology & Data Sources

Data Sources

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor’s Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

Data Type	Source
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: economicmodeling.com .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: https://www.bls.gov/emp/tables/educational-attainment.htm .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: labormarketinfo.edd.ca.gov .
Job Posting and Skills Data	Burning Glass: burning-glass.com/ .
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: onetonline.org .

Key Terms and Concepts

Annual Job Openings: Annual openings are calculated by dividing the number of years in the projection period by total job openings.

Education Attainment Level: The highest education attainment level of workers age 25 years or older.

Employment Estimate: The total number of workers currently employed.

Employment Projections: Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

Living Wage: The cost of living in a specific community or region for one adult and no children. The cost increases with the addition of children.

Occupation: An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

Percent Change: Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

Replacements: Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

Total Job Openings (New + Replacements): Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs, or retain the current employment level, number of openings will equal replacements.

Typical Education Requirement: represents the typical education level most workers need to enter an occupation.

Typical On-The-Job Training: indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.