March 2022

# Labor Market Analysis
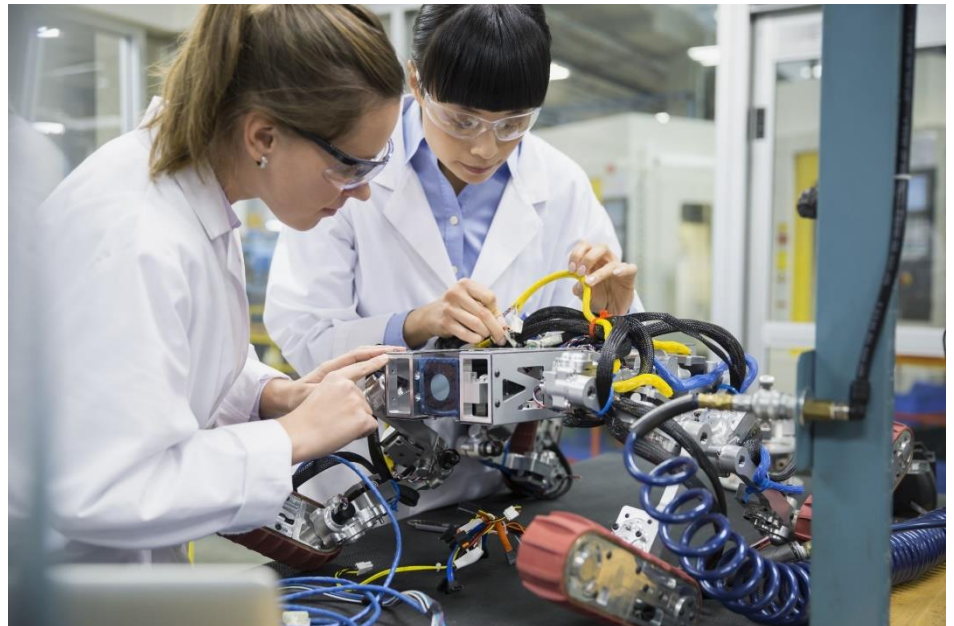
## Machinery Maintenance Apprenticeship

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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.

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# 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

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[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://insightcced.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.
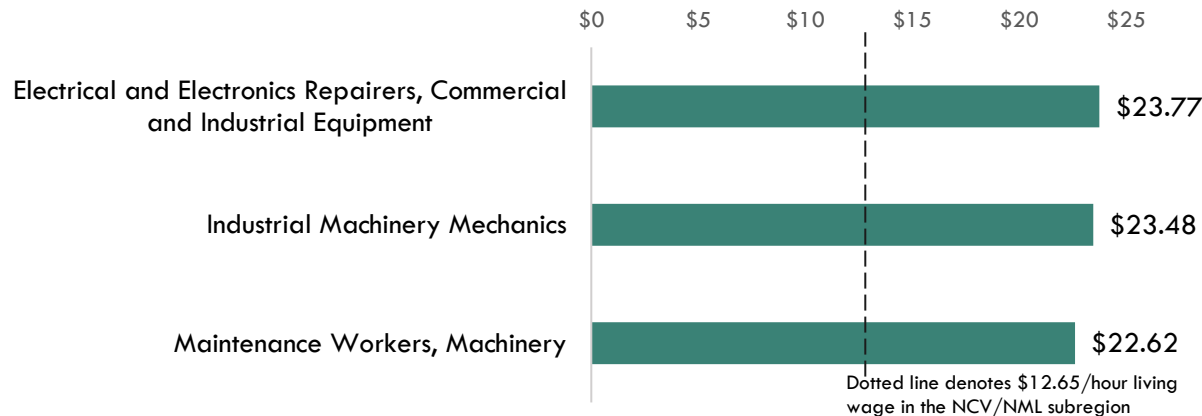
**Exhibit 1. Machinery maintenance employment and occupational projections in the NCV/NML subregion**

| 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 subregion[2].

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

| Occupation | Entry-level wage |
|---|---|
| Electrical and Electronics Repairers, Commercial and Industrial Equipment | $23.77 |
| Industrial Machinery Mechanics | $23.48 |
| Maintenance Workers, Machinery | $22.62 |

Dotted line denotes $12.65/hour living wage 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.

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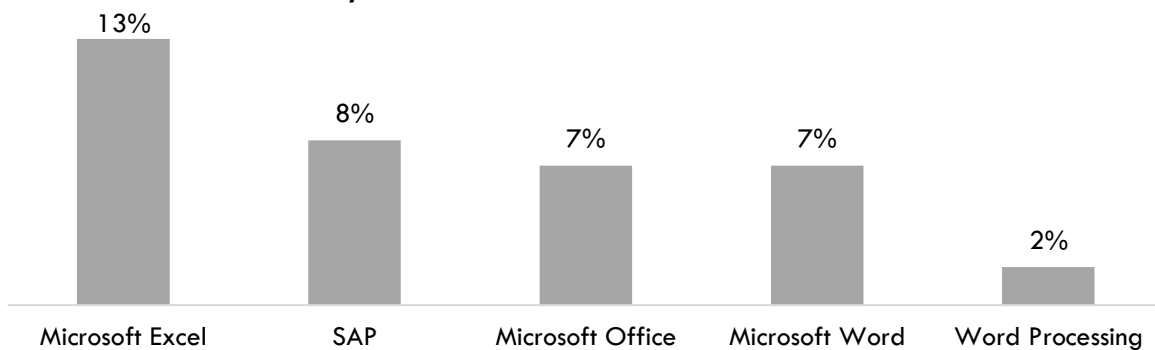
**Exhibit 7. In-demand machinery maintenance baseline and specialized skills**
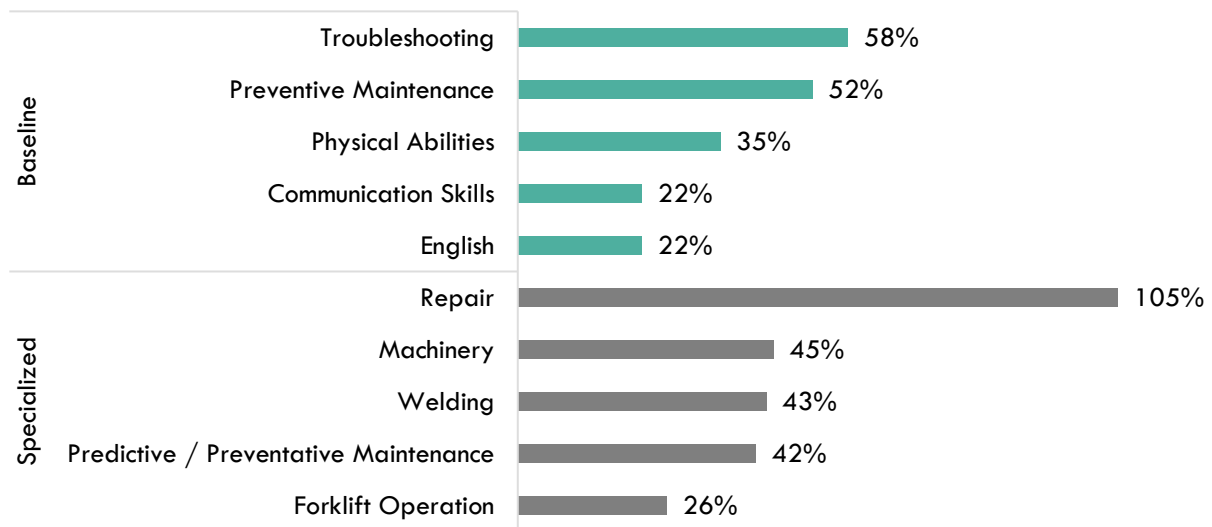


**Software Skills**

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**
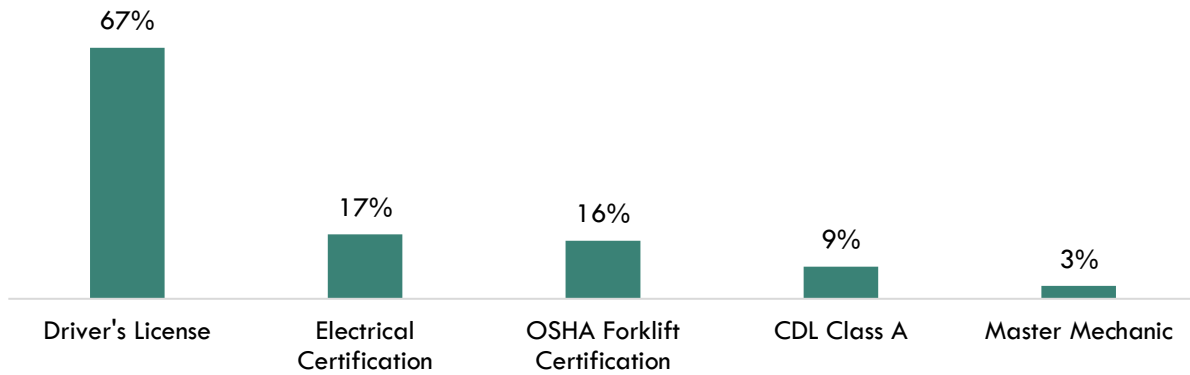


# Education, Work Experience & Training

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 occupations[4]**

| 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% |

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[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**
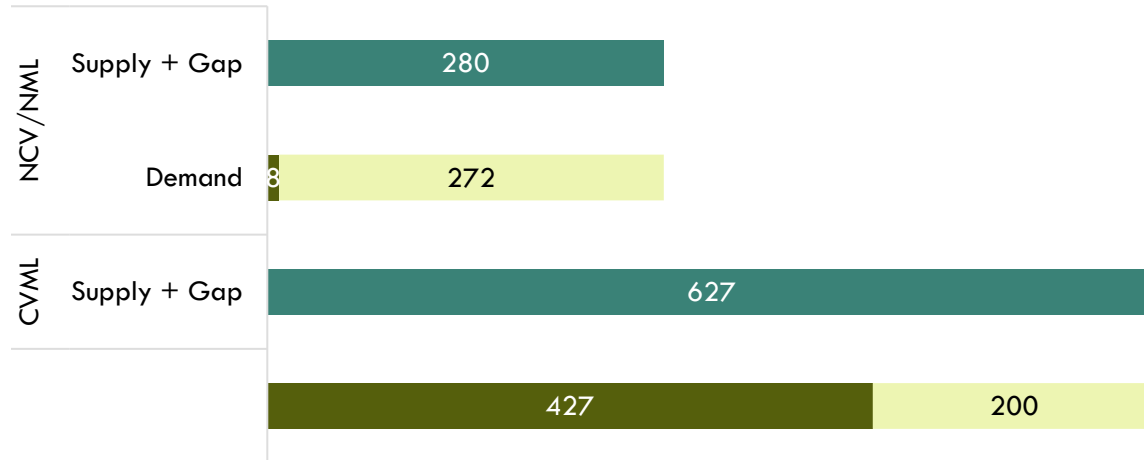


# Student Outcomes

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<br>094500 | Manufacturing and Industrial Technology<br>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.