

Industrial Systems Technology & Maintenance

Inland Empire/Desert Region (IEDR, Riverside and San Bernardino counties combined)

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.

Summary

- The knowledge, skills, and abilities provided by the community college industrial systems technology
 and maintenance programs lead to five distinct, middle-skill occupations, collectively referred to as
 the facilities maintenance occupational group in this report.
- IEDR employment for the facilities maintenance occupational group is expected to increase by 8% between 2019 and 2024. A total of 2,668 annual job openings will be available each year over the five-year timeframe.
- The median, 50th percentile, hourly wages for the occupations in this group are between \$19.68 and \$31.85 per hour. Median wages for four of the five facilities maintenance occupations in this group are above the \$19.94 per hour self-sustainable hourly wage estimate for a single adult with one child.
- There were **8 credentials issued** from the three regional community college programs related to industrial systems technology and maintenance over the last three academic years.
- The Centers of Excellence <u>recommends</u> creating or expanding industrial systems technology and maintenance programs to meet the regional need for more workers. Please see the <u>recommendation</u> section for further details

Introduction

This report provides data on programs and occupations related to facilities maintenance. California Community College industrial systems technology and maintenance (TOP 0945.00) programs prepare students for employment through the instruction of design, construction, maintenance, and operation of mechanical, hydraulic, pneumatic, and electrical equipment and related systems, such as production machinery. These programs include building and plant maintenance (Taxonomy of Programs, 2012). The knowledge, skills, and abilities trained by this program lead to the occupations, displayed on the following page, collectively referred to as the facilities maintenance occupational group. Definitions, alternative job titles, education, and training requirements for the occupations in this group are available in the Appendix.



- Electrical and Electronics Repairers, Commercial and Industrial Equipment (SOC 49-2094)
- First-Line Supervisors of Production and Operating Workers (SOC 51-1011)
- Industrial Machinery Mechanics (SOC 49-9041)
- Maintenance and Repair Workers, General (SOC 49-9071)
- Mechanical Engineering Technologists and Technicians (SOC 17-3027)

Job Opportunities

In 2019, there were 22,908 jobs in the facilities maintenance occupational group in the Inland Empire/Desert region (IEDR). This occupational group is projected to increase employment by 8% through 2024. Employers are expected to have 13,339 job openings over the next five years to fill new jobs and backfill jobs that workers are permanently vacating (includes occupational transfers and retirements). Exhibit 1 displays five-year projected job growth, and Exhibit 2 displays historical (2014 to 2019) and projected (2019-2024) jobs for the facilities maintenance occupational group.

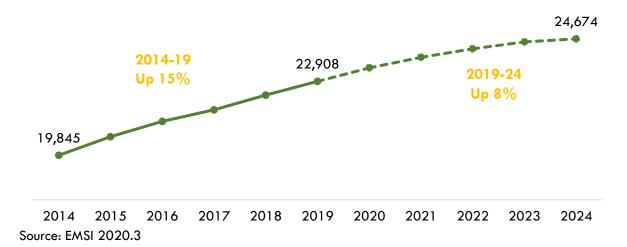
Exhibit 1: Five-year projections for each occupation in the facilities maintenance occupational group

Occupation	2019 Jobs	2024 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Maintenance and Repair Workers, General	14,252	15,604	9%	8,594	1 <i>,</i> 719	30%
First-Line Supervisors of Production and Operating Workers	4,845	5,045	4%	2,735	547	28%
Industrial Machinery Mechanics	3,043	3,227	6%	1,631	326	30%
Electrical and Electronics Repairers, Commercial and Industrial Equipment	645	663	3%	304	61	17%
Mechanical Engineering Technologists and Technicians	124	135	9%	75	15	~22%
Total	22,908	24,674	8%	13,339	2,668	29%

Source: EMSI 2020.3



Exhibit 2: Historical and projected jobs for the facilities maintenance occupational group, 2014 - 2024



Job Postings

Exhibit 3 displays the number of job ads for the facilities maintenance occupational group posted over the last 12 months, along with the regional and statewide average time to fill. There were too few job postings for electrical and electronics repairers, commercial and industrial equipment to obtain reliable job posting information; only 37 advertisements were posted for this occupation across the state over the last five years.

On average, local employers fill online job postings for the *facilities maintenance occupational group* within 39 days. This regional average is two days shorter than the statewide average of 41 days, indicating that local employers may face fewer challenges filling open positions than other employers in California as a whole.

Exhibit 3: Job ads and time to fill

Occupation	Job Ads	Regional Average Time to Fill (Days)	California Average Time to Fill (Days)
Maintenance and Repair Workers, General	4,344	40	41
First-Line Supervisors of Production and Operating Workers	1,129	36	41
Industrial Machinery Mechanics	677	41	42
Mechanical Engineering Technologists and Technicians	115	37	45
Electrical and Electronics Repairers, Commercial and Industrial Equipment	0	N/A	45
Total	6,265	39	41

Source: Burning Glass – Labor Insights



Earnings and Benefits

Community colleges should ensure their training programs lead to employment opportunities that provide a self-sustainable level of income. The Brookings Institute's Advancing Opportunity in California's Inland Empire report found that a "good job" wage in the region is above \$18.00 per hour, or \$37,440 per year (Shearer, Shah & Gootman, p. 25). The Family Needs Calculator estimates that a self-sustainable wage for a single adult with one school-age child is \$19.94 per hour (Pearce & Manzer, 2019).

Median wages for the facilities maintenance occupational group surpass the Brookings Institute's "good job" wage. Median wages for the facilities maintenance occupations, except for maintenance and repair workers, general, are above the Family Needs Calculator self-sustainability rate. Exhibit 4 displays the hourly earnings for each occupation in the IEDR.

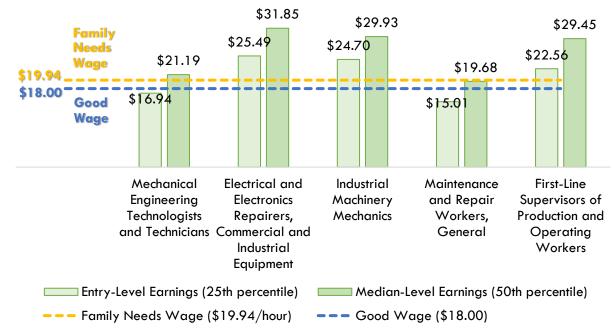


Exhibit 4: Hourly earnings for the facilities maintenance occupational group

Source: EMSI 2020.3

While the occupational guides developed by the California Labor Market Information Division typically provide occupational benefit information, this information is not available for the five occupations in the facilities maintenance occupational group (Detailed Occupational Guides, 2020).



Employers, Skills, Education, and Work Experience

Exhibit 5 displays the employers posting the most job ads for the facilities maintenance occupational group in the IEDR.

Exhibit 5: Employers posting the most job ads for facilities maintenance occupations

Occupation	Employers	
Maintenance and Repair Workers, General (n=3,510)	 National Community Renaissance C&W Services Cushman & Wakefield 	Daifuku IncorporatedFPI Management
First-Line Supervisors of Production and Operating Workers (n=785)	 Albertsons Companies (Distribution Facility) Pitney Bowes KeHE Distributors, LLC 	BrassCraft ManufacturingEncorr Sheets, LLC.
Industrial Machinery Mechanics (n=442)	Target (Distribution Facility)QVC, Inc.Niagara Bottling, LLC.	The Kroger Company (Distribution Facility)KIK Custom Products
Mechanical Engineering Technologists and Technicians (n=83)	 National Assemblers Applus+IDIADA Engineering Maury Microwave Corporation 	
Electrical and Electronics Repairers, Commercial and Industrial Equipment	• N/A	

Source: Burning Glass - Labor Insights

Exhibit 6 displays a sample of specialized and employability skills that employers are seeking when looking for workers to fill positions in the facilities maintenance occupational group. Specialized skills are occupation-specific skills that employers are requesting for industry or job competency. Employability skills are foundational skills that transcend industries and occupations; this category is often referred to as "soft skills." The skills requested in job postings may be utilized as a helpful guide for curriculum development.

Exhibit 6: Sample of in-demand skills from employer job ads

Occupation	Specialized Skills	Employability Skills		
Maintenance and Repair Workers, General (n=3,968)	PlumbingHVACCarpentry	Preventive MaintenanceTroubleshootingCommunication Skills		
First-Line Supervisors of Production and Operating Workers (n=1,014)	SchedulingBudgetingQuality Assurance and Control	Communication SkillsProblem SolvingOrganizational Skills		



Occupation	Specialized Skills	Employability Skills
Industrial Machinery Mechanics (n=625)	 Repair Predictive/Preventative Maintenance Welding 	TroubleshootingPhysical AbilitiesWork Area Maintenance
Mechanical Engineering Technologists and Technicians (n=87)	RepairMicrometersCalipers	Computer LiteracyTroubleshootingCommunication Skills
Electrical and Electronics Repairers, Commercial and Industrial Equipment	• N/A	• N/A

Source: Burning Glass – Labor Insights

Exhibit 7 displays the entry-level education typically required to enter each occupation according to the Bureau of Labor Statistics (BLS), educational attainment for incumbent workers with "some college, no degree" and an "associate degree" according to the U.S. Census (2016-17) and the real-time minimum advertised education requirement from employer job ads.

Exhibit 7: Typical entry-level education, educational attainment, and minimum advertised education

requirements for the facilities maintenance occupational group

	Typical Entry-	66.1	Real-Time Minimum Advertised Education Requirement				
Occupation	Level Education Requirement	CC-Level Educational Attainment*	Number of Job Ads	High school diploma or vocational training	Associate degree	Bachelor's degree or higher	
Maintenance and Repair Workers, General	High school diploma or equivalent	39%	2,270	95%	5%	N/A	
First-Line Supervisors of Production and Operating Workers	High school diploma or equivalent	34%	715	56%	8%	36%	
Industrial Machinery Mechanics	High school diploma or equivalent	42%	3 <i>5</i> 8	96%	4%	N/A	
Mechanical Engineering Technologists and Technicians	Associate degree	54%	70	99%	N/A	1%	
Electrical and Electronics Repairers, Commercial and Industrial Equipment	Postsecondary nondegree award	51%	N/A	N/A	N/A	N/A	

Source: EMSI 2020.3, Burning Glass – Labor Insights *Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework



Exhibit 8 displays the work experience typically required to enter each occupation and the real-time work experience requirements from employer job ads.

Exhibit 8: Work experience required and real-time work experience requirements

	Work Experience	Real-Time Work Experience				
Occupation	Typically Required	Number of Job Ads	0 – 2 years	3 – 5 years	6+ years	
Maintenance and Repair Workers, General	None	2,288	60%	36%	4%	
First-Line Supervisors of Production and Operating Workers	Less than 5 years	713	40%	48%	12%	
Industrial Machinery Mechanics	None	436	46%	52%	2%	
Mechanical Engineering Technologists and Technicians	None	68	24%	76%	N/A	
Electrical and Electronics Repairers, Commercial and Industrial Equipment	None	N/A	N/A	N/A	N/A	

Source: EMSI 2020.3, Burning Glass - Labor Insights

Student Completions and Program Outcomes

Exhibit 9 displays the annual average completion data for the California Community College Industrial Systems Technology and Maintenance (0945.00) program based on the most recent three academic years.

Exhibit 9: 2016-19, Annual average community college credentials for the industrial systems technology and maintenance program in the IEDR

0945.00 — Industrial Systems Technology and Maintenance	Associate degree	Certificate requiring 30 to < 60-semester units	Certificate requiring 16 to < 30-semester units	CCC Annual Average Credentials, Academic Years 2016-19	
Barstow	4	2	2	8	
Total	4	2	2	8	

Source: MIS Data Mart

California program outcome data may provide a useful insight into the likelihood of success for the proposed program. Community college student outcome information based on the selected TOP codes and region is provided in Exhibit 10. Dashes indicate that there were too few students to obtain reliable program outcome information. The outcome methodology is available in the appendix section of this report.



Exhibit 10: 0945.00 – Industrial systems technology and maintenance strong workforce program outcomes

Strong Workforce Program Metrics: 0945.00 – Industrial Systems Technology and Maintenance Academic Year 2017-18, unless noted otherwise	Inland Empire/Desert Region	California
Unduplicated count of enrolled students (2018-19)	51	1,057
Completed 9+ career education units in one year (2018-19)	55%	44%
Economically disadvantaged students	90%	72%
Students who attained a noncredit workforce milestone in a year (2018-19)	N/A	56%
Students who earned a degree, certificate, or attained apprenticeship (2018-19)	N/A	249
Transferred to a four-year institution (transfers)	N/A	17
Job closely related to the field of study (2016-17)	N/A	83%
Median annual earnings (all exiters)	N/A	\$45,064
Median change in earnings (all exiters)	N/A	47%
Attained a living wage (completers and skills-builders)	N/A	68%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Recommendation

California Community College industrial systems technology and maintenance programs lead to five (5) middle-skill occupations, collectively referred to as the facilities maintenance occupational group. These five middle-skill facilities maintenance occupations are projected to have 2,668 combined annual job openings over the next five years, increasing the total number of jobs by 8%. The maintenance and repair workers, general occupation will have the most annual job openings, 1,719, and the mechanical engineer technologist and technicians occupation is expected to have the fewest, 15 annual job openings. The median, 50th percentile wages for the facilities maintenance occupational group are between \$19.68 and \$31.85 per hour; four of the five facilities maintenance occupations in this group are above the \$19.94 per hour self-sustainable hourly wage estimate for a single adult with one child.

One IEDR community college offers the industrial systems technology and maintenance program coded under TOP 0945.00. This program conferred eight (8) annual average credentials over the last three academic years.

The Centers of Excellence <u>recommends</u> creating or expanding industrial systems technology and maintenance programs to meet the regional need for more workers. Colleges should focus on the knowledge, skills, and abilities that lead to the first-line supervisors of production and operating workers and the industrial machinery mechanics occupations due to the high number of annual job openings and



entry-level (25th percentile) self-sustainable wages. Maintenance and repair workers, general is expected to have plenty of annual job openings, but the median hourly wages fall just short of the self-sustainability wage standard (median was of \$19.68 versus self-sustainability \$19.94 per hour). The electrical and electronics repairers, commercial and industrial equipment occupation provides a self-sustainable wage but is projected to have only 61 annual job openings. This is a low number of job openings considering students may need to compete for jobs with experienced workers and an unknown number of job seekers from outside the region willing to commute for work. Colleges considering this program should meet with relevant employers to understand their demand for more workers and the specific skills, licensing, and credentials needed for gainful employment in this field.

Contact

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Appendix: Occupation definitions, sample job titles, five-year projections for facilities maintenance occupations

Occupation Definitions (SOC) code), Education and Training Requirement, Community College Educational Attainment

Mechanical Engineering Technologists and Technicians (17-3027)

Apply theory and principles of mechanical engineering to modify, develop, test, or calibrate machinery and equipment under the direction of engineering staff or physical scientists.

Sample job titles: Designer, Engineering Lab Technician, Engineering Technical Analyst, Laboratory
Technician, Maintenance Technician, Mechanical Designer, Mechanical Technician, Process Engineering
Technician, Process Technician, Research and Development Technician

Entry-Level Educational Requirement: Associate degree

Training Requirement: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 54%

Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)

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

Sample job titles: Control Technician, Electrical and Instrument Mechanic, Electrical and Instrument Technician (E&I Tech), Electrical Maintenance Technician, Electrical Technician, I&C Tech (Instrument and Control Technician), Instrument and Electrical Technician (I&E Tech), Repair Technician, Service Technician, Technical Support Specialist

Entry-Level Educational Requirement: Postsecondary nondegree award

Training Requirement: More than twelve months on-the-job training

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 51%

Industrial Machinery Mechanics (49-9041)

Repair, install, adjust, or maintain industrial production and processing machinery or refinery and pipeline distribution systems.

Sample job titles: Fixer, Industrial Machinery Mechanic, Industrial Mechanic, Loom Fixer, Machine Adjuster, Maintenance Mechanic, Maintenance Technician, Master Mechanic, Mechanic, Overhauler

Entry-Level Educational Requirement: High school diploma or equivalent

Training Requirement: More than twelve months on-the-job training

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 42%



Maintenance and Repair Workers, General (49-9071)

Perform work involving the skills of two or more maintenance or craft occupations to keep machines, mechanical equipment, or the structure of an establishment in repair. Duties may involve pipe fitting; boiler making; insulating; welding; machining; carpentry; repairing electrical or mechanical equipment; installing, aligning, and balancing new equipment; and repairing buildings, floors, or stairs.

Sample job titles: Building Maintenance Mechanic, Building Mechanic, Equipment Engineering Technician, Facilities Manager, Maintenance Engineer, Maintenance Man, Maintenance Mechanic, Maintenance Supervisor, Maintenance Technician, Maintenance Worker

Entry-Level Educational Requirement: High school diploma or equivalent

Training Requirement: Between one and twelve months on-the-job training

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 39%

First-Line Supervisors of Production and Operating Workers (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.

Sample job titles: Assembly Supervisor, Department Manager, Line Supervisor, Manufacturing Supervisor, Molding Supervisor, Plant Supervisor, Production Manager, Production Supervisor, Quality Assurance Supervisor (QA Supervisor), Shift Supervisor

Entry-Level Educational Requirement: High school diploma or equivalent Training Requirement: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 34%



Methodology and Data Notes

Exhibit 9 displays the average annual regional California Community College (CCC) credentials conferred during the three academic years between 2016 and 2019, from the California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart. Credentials are the combined total of associate degrees and certificates issued during the timeframe, divided by three in this case to calculate an annual average. This is done to minimize the effect of atypical variation that might be present in a single year.

Community college student outcome information is from LaunchBoard and based on the selected TOP code and region. These metrics are based on records submitted to the California Community Colleges

Chancellor's Office Management Information Systems (MIS) by community colleges, which come from self-reported student information from CCC Apply and the National Student Clearinghouse. Employment and earnings metrics are sourced from records provided by California's Employment Development

Department's Unemployment Insurance database. When available, outcomes for completers are reported to demonstrate the impact that earning a degree or certificate can have on employment and earnings. For more information on the types of students included for each metric, please see the web link for LaunchBoard's Strong Workforce Program Metrics Data Element Dictionary in the References section (LaunchBoard, 2020a). Finally, employment in a job closely related to the field of study comes from self-reported student responses on the CTE Employment Outcomes Survey (CTEOS), administered by Santa Rosa Junior College (LaunchBoard, 2020a).

Job postings data is limited to the information provided by employers and the ability of artificial intelligence search engines to identify this information. Additionally, preliminary calculations by Georgetown Center on Education and the Workforce found that "just 30 to 40 percent of openings for candidates with some college or an associate degree, and only 40 to 60 percent of openings for high school diploma holders appear online" (Carnevale et al., 2014).



Table 1: 2019 to 2024 job growth, wages, education, training, and work experience required for the facilities maintenance occupational group, IEDR

Occupation (SOC)	2019 Jobs	5-Yr Change	5-Yr % Change	Annual Openings (New + Replacement Jobs)	Entry-Experienced Hourly Wage Range (25th to 75th percentile)	Median Hourly Wage (50 th percentile)	Average Annual Earnings	Typical Entry- Level Education & On-The-Job Training Required	Work Experience Required
Maintenance and Repair Workers, General (49-9071)	14,252	1,352	9%	1,719	\$15.01 to \$26.29	\$19.68	\$44,000	High school diploma or equivalent & 1- 12 months	None
First-Line Supervisors of Production and Operating Workers (51-1011)	4,845	200	4%	547	\$22.56 to \$38.96	\$29.45	\$66,100	High school diploma or equivalent & None	Less than 5 years
Industrial Machinery Mechanics (49-9041)	3,043	184	6%	326	\$24.70 to \$36.01	\$29.93	\$62,400	High school diploma or equivalent & 12 months or more	None
Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)	645	18	3%	61	\$25.49 to \$38.61	\$31.85	\$66,300	Postsecondary nondegree award & 12 months or more	None
Mechanical Engineering Technologists and Technicians (17-3027	124	11	9%	15	\$16.94 to \$30.83	\$21.19	\$52,600	Associate's degree & None	None
Total	22,908	1,766	8%	2,668	-	-	-	-	-

Source: EMSI 2020.3