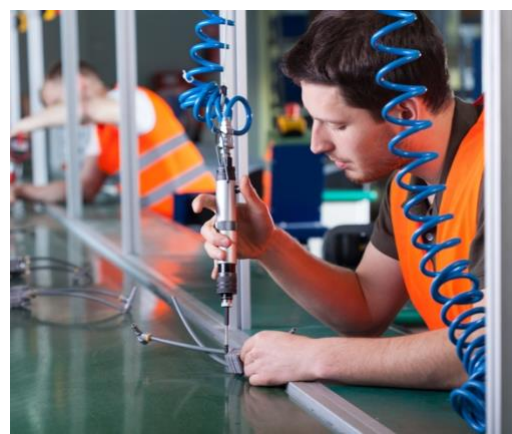


SECTOR PROFILE

Advanced Manufacturing



OCTOBER 2026



CENTER OF EXCELLENCE
FOR LABOR MARKET RESEARCH
BAY AREA



POWERED BY



California
Community
Colleges

Section	Page
Introduction	<u>2</u>
Quick Facts About Advanced Manufacturing in the Bay Region	<u>4</u>
Employment for the Advanced Manufacturing Sector	<u>5</u>
Occupation and Skill Levels by Advanced Manufacturing Pathways	<u>7</u>
Occupational Wages by Advanced Manufacturing Pathways	<u>13</u>
Job Postings for Advanced Manufacturing Occupations	<u>18</u>
Advanced Manufacturing Community College Programs	<u>19</u>
Demographic Profile of Students in Advanced Manufacturing Programs	<u>23</u>
Beyond Labor Market and Supply Data: Insights and Ideas to Inspire Action	<u>25</u>
Appendix A: Methodology	<u>32</u>

Introduction

To support the planning and development of career education programs and provide insights into career pathways within the sector, the Bay Region Center of Excellence (COE) has developed a series of sector profiles. These profiles highlight labor market trends and their implications for postsecondary education and workforce development within each sector in the Bay Region. They categorize jobs into three skill levels: below middle-skill, middle-skill, and above middle-skill jobs. Middle-skill occupations typically require more than a high school diploma, but less than a bachelor's degree except in cases where a bachelor's degree is required, but more than one-third of the workforce has less than a bachelor's degree. These occupations play a crucial role in the regional workforce and contribute to the economic vitality of the 12-county Bay Region, which includes the following counties: Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma.

This advanced manufacturing profile summarizes key findings on current and projected workforce demand, hourly wages for occupations within the sector by career pathways, and program information from community colleges in the region that offer training programs in advanced manufacturing. This report is intended for decision-makers and practitioners to support funding and grant proposals, the development of key courses and pathways, and the alignment of programs between K-12, community colleges, and four-year institutions. Workforce professionals in the sector can also use the data to gain valuable insights into employment trends and educational preparation within this pathway.

What Pathways Make Up the Advanced Manufacturing Sector?

This profile highlights the labor market for advanced manufacturing, focusing on four key career pathways. The labor market data presented in this profile includes in-demand occupations within these pathways that are related to advanced manufacturing occupations and community college training programs across the Bay Region.

These advanced manufacturing career pathways collectively represent the full spectrum of the advanced manufacturing sector, spanning everything from tool and die makers in metal fabrication, to working in engineering roles and technical support positions. Across these pathways, roles exist at every skill level, from entry-level production workers to highly specialized technicians. The metal fabrication pathway aligns with occupations that support the design, production, fabrication, and finishing of metal and plastic components through machining, welding, computer numerical control (CNC) technology, and toolmaking. The production (assembly) pathway aligns with occupations involved in assembling, fabricating, finishing, packaging, and supervising manufactured products across industrial production settings. The production (operators) pathway supports the day-to-day operation of machines, equipment, and plant systems used in food production, metals and plastics, chemicals, woodworking, utilities, and other production environments. Lastly, occupations in the technicians pathway support manufacturing through technical design, engineering support, machinery maintenance, calibration, testing, inspection, and quality control. These pathways do not represent every occupation within the advanced manufacturing sector.

ADVANCED MANUFACTURING CAREER PATHWAYS
Metal Fabrication
Production (Assembly)
Production (Operators)
Technicians

Quick Facts About Advanced Manufacturing in the Bay Region

Quick facts provide data related to the advanced manufacturing sector (see below), featuring labor market projections between 2024 and 2029 in the Bay Region, as well as community college program information for the program years 2022-23 to 2024-25. Enrolled students include students who were enrolled in at least one term of the selected year at a Bay Region community college.¹

The advanced manufacturing sector accounted for approximately 158,650 jobs in the Bay Region in 2024, and is projected to decrease by 2% between 2024 and 2029. This reflects a modest decline, driven primarily by replacement demand rather than the creation of new jobs. During this five-year period, the occupations specified in this report are expected to account for 17,550 average annual job openings, and an average of 91% of job openings in the pathways are replacement openings. Note that numbers related to labor market data in this report are rounded to the nearest tenth.

Advanced Manufacturing programs were offered at 23 community colleges in the Bay Region (see Table 8 for the advanced manufacturing programs included). An average of more than 5,758 students enrolled in advanced manufacturing programs annually at a Bay Region community college during the program years 2022-23 to 2024-25, and an average of 820 awards were conferred each year. As for demographics, approximately 26% of students who enrolled between program years 2022-23 to 2024-25 were between 20 and 24 years old. Males comprised the majority among students who enrolled in advanced manufacturing programs (81%), as well as students who identify as Hispanic (44%) or white (29%).

Bay Region Quick Facts



158,650

Number of Jobs
in Pathways,
2024



-2%

5-Year Pathway
Job Decline,
2024-2029



17,550

Avg. Annual
Job Openings,
2024-2029



23

Community Colleges (CC)
Offering Advanced Manufacturing
Programs



5,758

Students Enrolled in
CC Advanced Manufacturing
Programs (2022-23 to 2024-25)



820

CC Degrees/Certificates Awarded on
Average in Advanced Manufacturing
(2022-23 to 2024-25)

¹ This term was updated in DataVista from "non-special admit students" used in previous reports. General admit students are defined as all students who enrolled as first-time in higher education general admit credit students in at least one primary term of the selected year with a minimal credit enrollment at the selected college who are tracked for one, two, three, four and six years from first term of enrollment. <https://datavista.cccco.edu/metrics/126>.

Employment for the Advanced Manufacturing Sector

Industry Employment Demand

The advanced manufacturing sector includes sub-sectors and industries classified under North American Industry Classification System (NAICS) codes 31, 32, and 33 based on staffing patterns (see Appendix A: Methodology for the six-digit NAICS codes used to define the sector). A two-digit NAICS code can represent multiple sub-sectors and industry groups within the broader sector. These codes are used to organize and categorize industries within the job market.

Table 1 shows that the number of industry jobs in the advanced manufacturing sector is projected to decrease modestly between 2024 and 2029. In 2024, approximately 305,840 workers were employed in advanced manufacturing related industries in the region, and this number is projected to decrease by 1% through 2029. This number includes all jobs in manufacturing, including entry-level and middle-skill, as well as all categories of jobs, such as technicians, engineers, accountants, human resources, etc. Occupational data in this report (approximately 158,600 jobs) focuses on the selected middle-skill and below middle-skill occupations in each pathway, which are occupations that typically require less than a bachelor's degree. More information about trends is provided in the beyond labor market and supply data section.

Table 1: Industry Demand for the Advanced Manufacturing Sector

2024 JOBS	2029 JOBS	JOB CHANGE	% CHANGE
305,840	302,400	-3,440	-1%

Source: Lightcast, Projected Number of Industry Jobs for Advanced Manufacturing by NAICS, 2024-2029 [2026.1].

Occupational Demand

To connect overall industry trends with specific roles, the following section examines occupational demand in more detail for selected middle-skill and below middle-skill occupations. When examining demand for advanced manufacturing, Table 2 summarizes the number of workers employed in each pathway in 2024, and the total projected openings between 2024 and 2029 in the Bay Region. The advanced manufacturing career pathways employed 158,650 workers in 2024 and are projected to generate approximately 87,800 total openings over the five-year projection period.

Table 2: Total Jobs and Openings for Advanced Manufacturing Career Pathways (2024-2029)

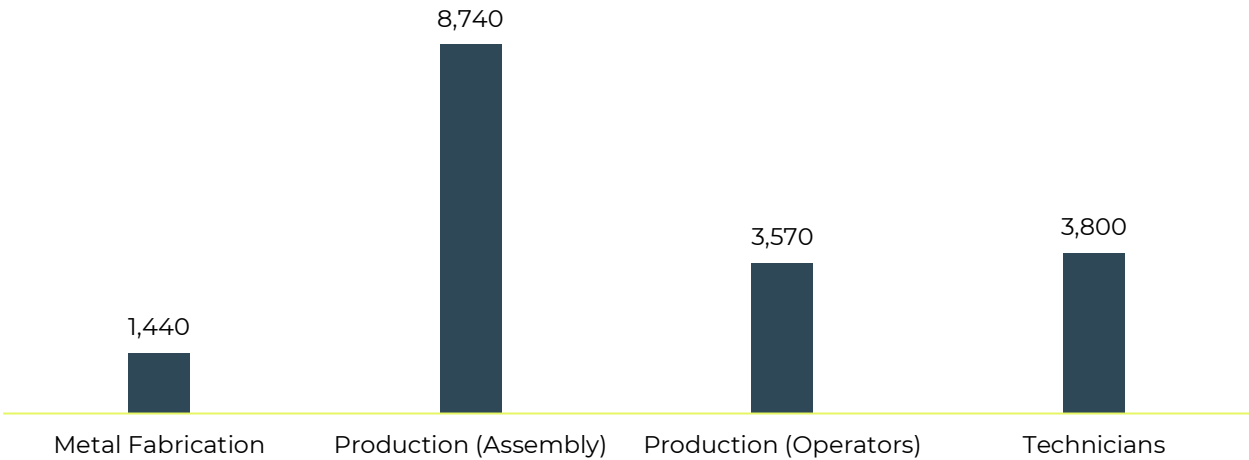
PATHWAYS	2024 JOBS	2024 - 2029 TOTAL OPENINGS*
Metal Fabrication	14,510	7,240
Production (Assembly)	73,900	43,680
Production (Operators)	33,150	17,830
Technicians	37,090	19,050

Source: Lightcast, Number of Jobs and Total Openings, 2024-2029 [2026.1].

*2024-2029 total openings are new job openings and replacement job openings across the five-year period. Replacement openings are created as workers switch jobs, retire or leave for other reasons.

In terms of average annual openings, Figure 1 shows the projected average annual job openings for the advanced manufacturing pathways. Occupations within the advanced manufacturing pathways are projected to generate approximately 17,550 average annual job openings between 2024 and 2029, and over 8,740 average annual job openings were for the production (assembly) pathway.

Figure 1: Average Annual Job Openings for Advanced Manufacturing Career Pathways (2024-2029)



Source: Lightcast, Average Annual Job Openings, 2024-2029 [2026.1].

Occupations and Skill Levels by Advanced Manufacturing Career Pathways

When examining specific occupations within the advanced manufacturing sector, Table 3 below presents data on employment and projected demand by occupation, grouped by career pathways and skill levels. The production (operators) pathway is the largest, with a total of 47 occupations. This pathway includes the greatest number of occupations and is also projected to experience a decrease in jobs over five years. The highest demand is for production (assembly), with 8,740 annual openings. Across all pathways, occupations are projected to decrease by 2% overall, while individual occupations range from 20% growth to 42% decline.

Please note that the figures in Table 3 are rounded to the nearest ten, and totals represent the summed averages. On average, 91% of job openings in the pathways are replacement openings. Replacement openings occur when workers switch jobs, retire or leave for other reasons. Please refer to Appendix A: Methodology for more information on how the pathways were defined.

SKILL LEVEL LEGEND

• • = Middle-Skill • = Below Middle-Skill

Table 3: Occupations and Projected Demand for Advanced Manufacturing (2024-2029)

Skill Level	SOC	Occupation	Avg. Annual Openings	2024 Jobs	5-Yr Change	5-Yr % Change	Replacements as % of Openings
Metal Fabrication							
• •	51-4121	Welders, Cutters, Solderers, and Brazers	490	4,800	20	1%	93%
• •	51-4041	Machinists	480	4,730	20	0%	90%
• •	51-9161	Computer Numerically Controlled Tool Operators	290	3,220	-170	-5%	94%
• •	51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	80	830	-30	-4%	92%
• •	51-9162	Computer Numerically Controlled Tool Programmers	60	570	30	5%	84%
• •	51-4111	Tool and Die Makers	30	240	10	5%	85%
•	51-4061	Model Makers, Metal and Plastic*	10	120	-10	-7%	98%
	TOTAL		1,440	14,510	-130	-1%	91%

*Occupation also aligns with the energy, construction, and utilities sector

Skill Level	SOC	Occupation	Avg. Annual Openings	2024 Jobs	5-Yr Change	5-Yr % Change	Replacements as % of Openings
Production (Assembly)							
••	51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	1,450	13,140	50	0%	90%
••	51-1011	First-Line Supervisors of Production and Operating Workers	1,050	10,520	90	1%	93%
••	51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers**	50	320	40	10%	69%
•	51-2098	Miscellaneous Assemblers and Fabricators	2,970	24,570	780	3%	93%
•	53-7064	Packers and Packagers, Hand	1,780	13,360	-480	-4%	98%
•	51-9199	Production Workers, All Other	770	7,250	-250	-3%	97%
•	51-9198	Helpers--Production Workers	520	3,430	-270	-8%	99%
•	51-2031	Engine and Other Machine Assemblers	40	340	0	1%	88%
•	51-2041	Structural Metal Fabricators and Fitters	40	400	-30	-8%	94%
•	51-2021	Coil Winders, Tapers, and Finishers	20	160	10	2%	88%
•	51-2051	Fiberglass Laminators and Fabricators	20	150	10	6%	81%
•	51-4071	Foundry Mold and Coremakers	10	110	-10	-12%	82%
•	51-4192	Layout Workers, Metal and Plastic	10	90	-10	-3%	90%
•	51-9031	Cutters and Trimmers, Hand	10	50	-10	-12%	99%
•	51-2061	Timing Device Assemblers and Adjusters	0	10	0	14%	83%
	TOTAL		8,740	73,900	-80	-1%	90%

Production (Operators)

••	51-8031	Water and Wastewater Treatment Plant and System Operators*	220	2,350	20	1%	95%
----	---------	--	-----	-------	----	----	-----

*Occupation also aligns with the energy, construction, and utilities sector

**Occupation also aligns with the advanced transportation and logistics sector

Skill Level	SOC	Occupation	Avg. Annual Openings	2024 Jobs	5-Yr Change	5-Yr % Change	Replacements as % of Openings
• •	51-7011	Cabinetmakers and Bench Carpenters*	170	1,670	-70	-4%	95%
• •	51-9011	Chemical Equipment Operators and Tenders	170	1,510	-70	-4%	82%
• •	51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	140	1,460	-100	-7%	93%
• •	51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	130	1,240	-70	-6%	94%
• •	51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	120	990	-50	-5%	96%
• •	51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	110	880	70	8%	89%
• •	51-4034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	50	530	-60	-12%	93%
• •	51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	50	520	-60	-11%	95%
• •	51-5111	Prepress Technicians and Workers	50	370	-40	-12%	97%
• •	51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing*	50	430	0	1%	87%
• •	51-4199	Metal Workers and Plastic Workers, All Other	40	440	-50	-11%	95%
• •	51-7041	Sawing Machine Setters, Operators, and Tenders, Wood*	40	330	20	4%	89%
• •	51-8091	Chemical Plant and System Operators	30	300	-30	-9%	87%
• •	51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	20	160	-20	-10%	91%
• •	51-7099	Woodworkers, All Other*	20	210	-20	-10%	96%
• •	51-8092	Gas Plant Operators*	20	110	20	20%	66%
• •	51-7031	Model Makers, Wood*	0	10	-10	-42%	100%
• •	51-7032	Patternmakers, Wood*	0	0	0	0%	0%

*Occupation also aligns with the energy, construction, and utilities sector

Skill Level	SOC	Occupation	Avg. Annual Openings	2024 Jobs	5-Yr Change	5-Yr % Change	Replacements as % of Openings
•	51-3092	Food Batchmakers	430	3,020	140	5%	91%
•	51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	370	3,570	-250	-7%	98%
•	51-3099	Food Processing Workers, All Other	160	1,490	0	0%	94%
•	51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	150	1,460	-120	-8%	98%
•	51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	130	1,320	-60	-5%	96%
•	51-4193	Plating Machine Setters, Operators, and Tenders, Metal and Plastic	100	1,080	-90	-8%	95%
•	51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers*	100	1,150	-210	-18%	89%
•	51-3093	Food Cooking Machine Operators and Tenders	90	620	0	0%	94%
•	51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	80	760	-20	-4%	87%
•	51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	70	600	-30	-5%	95%
•	51-3091	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders	60	480	10	3%	92%
•	51-9196	Paper Goods Machine Setters, Operators, and Tenders	60	640	-80	-13%	86%
•	51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	50	600	-20	-3%	92%
•	51-9192	Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	50	420	-10	-2%	94%
•	51-8099	Plant and System Operators, All Other*	40	370	-20	-5%	96%
•	51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	40	430	-10	-4%	92%
•	51-9022	Grinding and Polishing Workers, Hand	30	300	-40	-13%	99%
•	51-4194	Tool Grinders, Filers, and Sharpeners	20	180	-10	-7%	96%

*Occupation also aligns with the energy, construction, and utilities sector

Skill Level	SOC	Occupation	Avg. Annual Openings	2024 Jobs	5-Yr Change	5-Yr % Change	Replacements as % of Openings
•	51-6091	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	20	120	-10	-4%	92%
•	51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	20	190	-10	-3%	92%
•	51-9194	Etchers and Engravers	20	230	-20	-6%	96%
•	51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	10	150	-20	-15%	90%
•	51-4051	Metal-Refining Furnace Operators and Tenders	10	70	-10	-13%	79%
•	51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	10	100	-10	-2%	93%
•	51-9191	Adhesive Bonding Machine Operators and Tenders	10	110	0	4%	81%
•	51-9193	Cooling and Freezing Equipment Operators and Tenders	10	120	0	-1%	93%
•	51-4022	Forging Machine Setters, Operators, and Tenders, Metal and Plastic	0	50	-10	-10%	89%
•	51-4052	Pourers and Casters, Metal	0	10	0	0%	80%
		TOTAL	3,570	33,150	-1,430	-5%	92%
Technicians							
••	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1,690	14,430	-260	-2%	96%
••	49-9041	Industrial Machinery Mechanics	540	5,440	400	7%	84%
••	17-3023	Electrical and Electronic Engineering Technologists and Technicians	400	4,520	-160	-3%	94%
••	17-3029	Engineering Technologists and Technicians, Except Drafters, All Other	210	2,340	20	1%	90%
••	51-9141	Semiconductor Processing Technicians	190	1,510	100	6%	88%
••	17-3026	Industrial Engineering Technologists and Technicians	140	1,470	40	3%	85%
••	17-3027	Mechanical Engineering Technologists and Technicians	100	1,150	20	1%	84%
••	17-3013	Mechanical Drafters	80	1,000	-40	-4%	94%

Skill Level	SOC	Occupation	Avg. Annual Openings	2024 Jobs	5-Yr Change	5-Yr % Change	Replacements as % of Openings
• •	17-3012	Electrical and Electronics Drafters	70	870	-50	-6%	95%
• •	17-3024	Electro-Mechanical and Mechatronics Technologists and Technicians	70	880	-20	-3%	92%
• •	49-9043	Maintenance Workers, Machinery	60	640	0	0%	93%
• •	49-9044	Millwrights	60	610	-10	-2%	92%
• •	17-3019	Drafters, All Other*	40	470	-40	-7%	100%
• •	17-3021	Aerospace Engineering and Operations Technologists and Technicians**	30	280	20	8%	82%
• •	17-3025	Environmental Engineering Technologists and Technicians*	30	390	0	0%	92%
• •	17-3028	Calibration Technologists and Technicians	30	380	0	0%	84%
• •	49-2093	Electrical and Electronics Installers and Repairers, Transportation Equipment**	30	420	0	0%	92%
• •	49-9069	Precision Instrument and Equipment Repairers, All Other	30	290	-10	-5%	89%
		TOTAL	3,800	37,090	10	0%	90%
ADVANCED MANUFACTURING TOTAL			17,550	158,650	-1,630	-2%	91%

Source: Lightcast, Projected Demand for Advanced Manufacturing Occupations, 2024-2029 [2026.1].

*Occupation also aligns with the energy, construction, and utilities sector

**Occupation also aligns with the advanced transportation and logistics sector

Occupational Wages by Advanced Manufacturing Pathways

In the Bay Region, the median living wage is \$46 per hour for one adult and one school-aged child, though it varies by subregion (see Table 12 in the Appendix for details). Figure 2 presents the average median hourly earnings for below middle-skill, middle-skill, and above middle-skill jobs by career pathways. Table 4 provides a summary of wages by the 25th percentile, median, and 75th percentile hourly earnings for each occupation. Hourly earnings represent the median wage across the 12-county Bay Region. The 25th percentile wage represents entry-level earnings, while the 75th percentile wage reflects the earnings of experienced workers.

Figure 2: Average Median Hourly Earnings by Advanced Manufacturing Career Pathways



Source: Lightcast, Median Hourly Wages by Advanced Manufacturing Career Pathways [2026.1].

Table 4: Hourly Earnings for Occupations by Advanced Manufacturing Career Pathways

SKILL LEVEL LEGEND				
• • = Middle-Skill • = Below Middle-Skill				
Skill Level	Occupation	25 th Pct. Hourly Earnings	Median Hourly Earnings	75 th Pct. Hourly Earnings
Metal Fabrication				
• •	Computer Numerically Controlled Tool Programmers	\$36	\$43	\$53
• •	Tool and Die Makers	\$28	\$39	\$46
• •	Machinists	\$25	\$30	\$39

Skill Level	Occupation	25 th Pct. Hourly Earnings	Median Hourly Earnings	75 th Pct. Hourly Earnings
••	Welders, Cutters, Solderers, and Brazers	\$25	\$29	\$37
••	Computer Numerically Controlled Tool Operators	\$23	\$28	\$35
••	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	\$22	\$25	\$29
•	Model Makers, Metal and Plastic	\$31	\$38	\$49
	TOTAL	\$27	\$33	\$41

Production (Assembly)

••	First-Line Supervisors of Production and Operating Workers	\$30	\$38	\$50
••	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	\$24	\$28	\$35
••	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	\$20	\$24	\$29
•	Layout Workers, Metal and Plastic	\$29	\$32	\$38
•	Structural Metal Fabricators and Fitters	\$24	\$30	\$35
•	Fiberglass Laminators and Fabricators	\$21	\$25	\$32
•	Miscellaneous Assemblers and Fabricators	\$21	\$24	\$28
•	Foundry Mold and Coremakers	\$21	\$24	\$27
•	Engine and Other Machine Assemblers	\$20	\$24	\$36
•	Coil Winders, Tapers, and Finishers	\$19	\$21	\$25
•	Helpers--Production Workers	\$19	\$23	\$25
•	Production Workers, All Other	\$19	\$22	\$27
•	Packers and Packagers, Hand	\$18	\$19	\$21
•	Cutters and Trimmers, Hand	\$17	\$18	\$23
•	Timing Device Assemblers and Adjusters	\$8	\$9	\$13
	TOTAL	\$21	\$24	\$30

Production (Operators)

••	Gas Plant Operators	\$57	\$66	\$71
••	Water and Wastewater Treatment Plant and System Operators	\$41	\$50	\$57
••	Chemical Plant and System Operators	\$34	\$39	\$47
••	Chemical Equipment Operators and Tenders	\$26	\$30	\$37

Skill Level	Occupation	25 th Pct. Hourly Earnings	Median Hourly Earnings	75 th Pct. Hourly Earnings
• •	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	\$25	\$29	\$35
• •	Metal Workers and Plastic Workers, All Other	\$24	\$25	\$27
• •	Molders, Shapers, and Casters, Except Metal and Plastic	\$23	\$28	\$32
• •	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	\$22	\$25	\$29
• •	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	\$22	\$23	\$27
• •	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	\$22	\$26	\$32
• •	Prepress Technicians and Workers	\$22	\$24	\$30
• •	Cabinetmakers and Bench Carpenters	\$22	\$25	\$31
• •	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	\$21	\$23	\$27
• •	Sawing Machine Setters, Operators, and Tenders, Wood	\$21	\$23	\$27
• •	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	\$21	\$23	\$28
• •	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	\$20	\$23	\$27
• •	Model Makers, Wood	\$10	\$22	\$40
• •	Patternmakers, Wood	\$10	\$21	\$38
• •	Woodworkers, All Other	\$9	\$19	\$28
•	Petroleum Pump System Operators, Refinery Operators, and Gaugers	\$50	\$56	\$61
•	Plant and System Operators, All Other	\$30	\$38	\$44
•	Forging Machine Setters, Operators, and Tenders, Metal and Plastic	\$26	\$31	\$36
•	Metal-Refining Furnace Operators and Tenders	\$25	\$29	\$33
•	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	\$25	\$29	\$38
•	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	\$24	\$27	\$30
•	Paper Goods Machine Setters, Operators, and Tenders	\$24	\$29	\$33
•	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders	\$22	\$23	\$27
•	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	\$22	\$28	\$35
•	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	\$22	\$26	\$29

Skill Level	Occupation	25 th Pct. Hourly Earnings	Median Hourly Earnings	75 th Pct. Hourly Earnings
•	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	\$22	\$26	\$33
•	Mixing and Blending Machine Setters, Operators, and Tenders	\$22	\$28	\$33
•	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	\$21	\$25	\$27
•	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	\$21	\$24	\$27
•	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	\$21	\$25	\$28
•	Grinding and Polishing Workers, Hand	\$21	\$23	\$27
•	Cutting and Slicing Machine Setters, Operators, and Tenders	\$21	\$24	\$28
•	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	\$21	\$26	\$29
•	Adhesive Bonding Machine Operators and Tenders	\$21	\$22	\$28
•	Cooling and Freezing Equipment Operators and Tenders	\$21	\$22	\$26
•	Food Cooking Machine Operators and Tenders	\$20	\$22	\$23
•	Plating Machine Setters, Operators, and Tenders, Metal and Plastic	\$20	\$24	\$26
•	Tool Grinders, Filers, and Sharpeners	\$20	\$24	\$30
•	Food Batchmakers	\$19	\$21	\$24
•	Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	\$19	\$23	\$25
•	Etchers and Engravers	\$19	\$21	\$28
•	Food Processing Workers, All Other	\$18	\$19	\$22
•	Pourers and Casters, Metal	\$9	\$9	\$10
	TOTAL	\$23	\$27	\$32
Technicians				
••	Electrical and Electronics Installers and Repairers, Transportation Equipment	\$48	\$53	\$54
••	Mechanical Engineering Technologists and Technicians	\$37	\$42	\$52
••	Environmental Engineering Technologists and Technicians	\$35	\$42	\$52
••	Electrical and Electronic Engineering Technologists and Technicians	\$33	\$41	\$49
••	Electro-Mechanical and Mechatronics Technologists and Technicians	\$33	\$41	\$55

Skill Level	Occupation	25 th Pct. Hourly Earnings	Median Hourly Earnings	75 th Pct. Hourly Earnings
• •	Electrical and Electronics Drafters	\$32	\$37	\$46
• •	Mechanical Drafters	\$32	\$41	\$51
• •	Aerospace Engineering and Operations Technologists and Technicians	\$32	\$44	\$53
• •	Engineering Technologists and Technicians, Except Drafters, All Other	\$32	\$42	\$50
• •	Millwrights	\$32	\$42	\$56
• •	Industrial Machinery Mechanics	\$31	\$39	\$51
• •	Drafters, All Other	\$30	\$36	\$46
• •	Calibration Technologists and Technicians	\$30	\$35	\$44
• •	Industrial Engineering Technologists and Technicians	\$29	\$38	\$45
• •	Maintenance Workers, Machinery	\$29	\$35	\$42
• •	Precision Instrument and Equipment Repairers, All Other	\$28	\$37	\$47
• •	Semiconductor Processing Technicians	\$23	\$24	\$30
• •	Inspectors, Testers, Sorters, Samplers, and Weighers	\$22	\$27	\$35
	TOTAL	\$32	\$39	\$48
ADVANCED MANUFACTURING TOTAL		\$26	\$31	\$38

Source: Lightcast, 25th pct., Median, and 75th pct. Hourly Earnings for Advanced Manufacturing Occupations [2026.1].

Job Postings for Advanced Manufacturing Occupations

Job postings represent the number of online jobs advertised in the Bay Region for occupations in the advanced manufacturing pathways specified in this report. Unique online job postings are de-duplicated based on job title, employer, and region. Across occupations in the advanced manufacturing sector, there were 23,271 unique online job postings in the Bay Region from January 2025 to December 2025 (see Table 5). These postings represent job postings for the selected occupations and may not capture all hiring activity. Table 6 highlights the top 10 skills sought by employers, categorized into specialized, soft, and technical skills.

Table 5: Online Job Postings for Advanced Manufacturing Occupations in the Bay Region, 2025

Unique Online Job Postings in the Bay Region	23,271
---	--------

Table 6: Top Skills for Advanced Manufacturing Occupations

Specialized Skills	Workplace Skills	Technical Skills (Software and Automation)
Blueprint / Print Reading & GD&T	Problem Solving & Critical Thinking	Computer Aided Design (CAD)
Precision Machining (CNC & Manual)	Technical Communication	PLC Programming (Ladder Logic)
Quality Control & Metrology	Detail Orientation & Precision	CNC / CAM Programming (G-Code)
Troubleshooting & Diagnostic Repair	Operations & Teamwork	Spreadsheets (Excel for Quality / SPC)
Industrial Safety Processes (OSHA)	Adaptability & Continuous Learning	Robotic Systems & Automation Controls
Good Manufacturing Practices (GMP)	Time Management & Prioritization	Industrial HMI / SCADA Systems
Continuous Improvement (Lean / 5S / CIP)	Safety Mindset & Compliance	Circuit / Electronic Testing Software
Applied Shop Math	Active Listening	Digital Measurement & CMM Systems
Soldering & Electrical Assembly	Cross-Functional Collaboration	ERP / Asset Management Concepts

Table 7 lists the top employers in the advanced manufacturing sector across the Bay Region, including businesses and organizations in manufacturing, technology, aerospace, and healthcare.

Table 7: Top Employers² for Advanced Manufacturing Occupations



Aerotek	Adecco
Randstad	Sanmina
Kelly Services	Actalent
ManpowerGroup	Volt
Tesla	ATR International

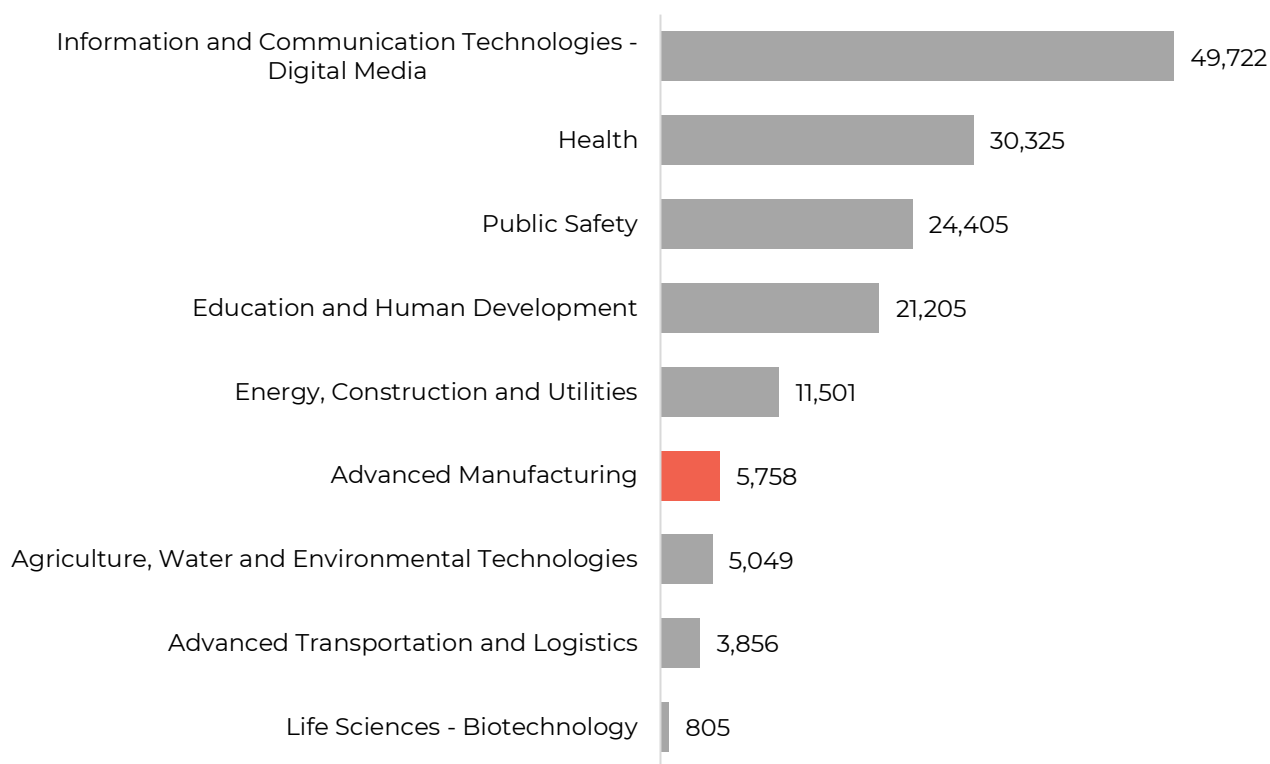
² Job posting analytics reflect a high volume of listings from technical staffing and recruiting agencies (e.g., Aerotek, Actalent, Randstad). These agencies recruit on behalf of regional small-and-medium manufacturers, while large direct employers (e.g., Tesla, Sanmina) post predominantly through internal hiring teams.

Advanced Manufacturing Community College Programs

California community colleges offer a variety of programs in advanced manufacturing. Colleges combine classroom instruction on campus, online, or through external work experiences. Of the 28 community colleges in the Bay Region, 23 offer a program related to advanced manufacturing. These community colleges include Alameda College, Cabrillo College, Cañada College, Chabot College, De Anza College, Diablo Valley College, Evergreen Valley College, Foothill College, Gavilan College, Hartnell College, Laney College, Las Positas College, Los Medanos College, College of Marin, Mission College, Napa Valley College, Ohlone College, City College of San Francisco, San Jose City College, Santa Rosa College, Skyline College, Solano College, and West Valley College.

Figure 3 shows the number of students enrolled by each of the Bay Region's nine sectors. These sectors refer to the priority sectors identified by the California Community Colleges Chancellor's Office. During program years 2022-23 to 2024-25, an average of more than 5,758 students enrolled in advanced manufacturing programs each year. For more information about the selection of programs and data sources for student outcomes see the Appendix A: Methodology.

Figure 3: Students Enrolled* by Sector (3-YR Average, 2022-23 to 2024-25)



Source: DataVista. Program Years 2022-23 to 2024-25, Bay Region Community Colleges.

*All students who were enrolled as a general admit student in at least one term of the selected year.

Nineteen (19) Taxonomy of Program (TOP) codes related to advanced manufacturing are presented in Table 8, and these TOP codes also have active or approved programs prior to March 2026 in Bay Region community colleges. This is based on information reported to the California Community Colleges Chancellor's Office Curriculum Inventory (COCI).

Table 8: Advanced Manufacturing Programs at Community Colleges in the Bay Region

TOP6	TOP6 Program Title	# Colleges w/Programs
092400	Engineering Technology, General (requires Trigonometry)	6
093400	Electronics and Electric Technology	6
093410	Computer Electronics	2
093420	Industrial Electronics	1
093480	Laser and Optical Technology	2
093600	Printing and Lithography	1
094500	Industrial Systems Technology and Maintenance	5
095000	Aeronautical and Aviation Technology	4
095040	Aircraft Electronics (Avionics)	1
095340	Mechanical Drafting	1
095360	Technical Illustration	1
095600	Manufacturing and Industrial Technology	9
095630	Machining and Machine Tools	7
095650	Welding Technology	11
095670	Industrial and Occupational Safety and Health	2
095680	Industrial Quality Control	3
095730	Surveying	2
130330	Fashion Production	1
192000	Ocean Technology	1

Source: California Community Colleges Chancellor's Office Curriculum Inventory (COCI). This list includes the programs under the TOP code that were currently active or approved in Bay Region community colleges prior to March 2026.

Tables 9 and 10 summarize educational supply by analyzing the number of certificates and degrees awarded in related TOP and Classification of Instructional Programs (CIP) codes, respectively. According to TOP data, an average of 820 awards were conferred at Bay Region community colleges between program years 2022-23 to 2024-25 (Table 9). The average number of awards in programs may include students who earned multiple degrees, certificates, or non-credit awards. Compared to approximately 17,550 annual job openings, this suggests a substantial gap between workforce demand and the number of program completers.

Table 9: Total Awards at Community Colleges in the Bay Region (2022-23 to 2024-25)

TOP6	TOP6 Title	Certificate	Associate Degree	Noncredit Award	Total Awards
092400	Engineering Technology, General (requires Trigonometry)	73	16	0	89
093400	Electronics and Electric Technology	158	45	0	203
093420	Industrial Electronics	11	8	0	19
093480	Laser and Optical Technology	4	2	0	6
094500	Industrial Systems Technology and Maintenance	25	12	0	36
095000	Aeronautical and Aviation Technology	16	6	0	23
095340	Mechanical Drafting	2	0	0	2
095600	Manufacturing and Industrial Technology	61	6	10	76
095630	Machining and Machine Tools	129	27	0	155
095650	Welding Technology	113	40	0	152
095670	Industrial and Occupational Safety and Health	19	4	0	23
095680	Industrial Quality Control	16	0	0	16
095730	Surveying	6	7	0	14
130330	Fashion Production	1	2	0	4
192000	Ocean Technology	2	0	0	2
Total Awards		635	176	10	820

Source: CCCC Data Mart. Program Years 2022-23 to 2024-25 Annual Awards, by TOP6 Code, Bay Region Community Colleges.

According to CIP data (Table 10), non-community college institutions in the Bay Region conferred an average of 441 CIP awards between program years 2021-22 to 2023-24.

Table 10: Awards for Non-Community College Programs in the Bay Region (2021-22 to 2023-24)

CIP - CIP Program Title	Certificate	Associate Degree	Bachelor's	Total Awards
15.0000 - Engineering Technologies/Technicians, General	0	0	85	85
15.0612 - Industrial Technology/Technician	0	0	23	23
19.0902 - Apparel and Textile Manufacture	0	1	15	16
30.3201 - Marine Sciences	0	0	86	86
47.0105 - Industrial Electronics Technology/Technician	3	0	0	3
47.0303 - Industrial Mechanics and Maintenance Technology/Technician	11	0	0	11
47.0607 - Airframe Mechanics and Aircraft Maintenance Technology/Technician	111	0	0	111
48.0508 - Welding Technology/Welder	28	0	0	28
50.0410 - Illustration	0	12	65	77
Total Awards	153	13	274	441

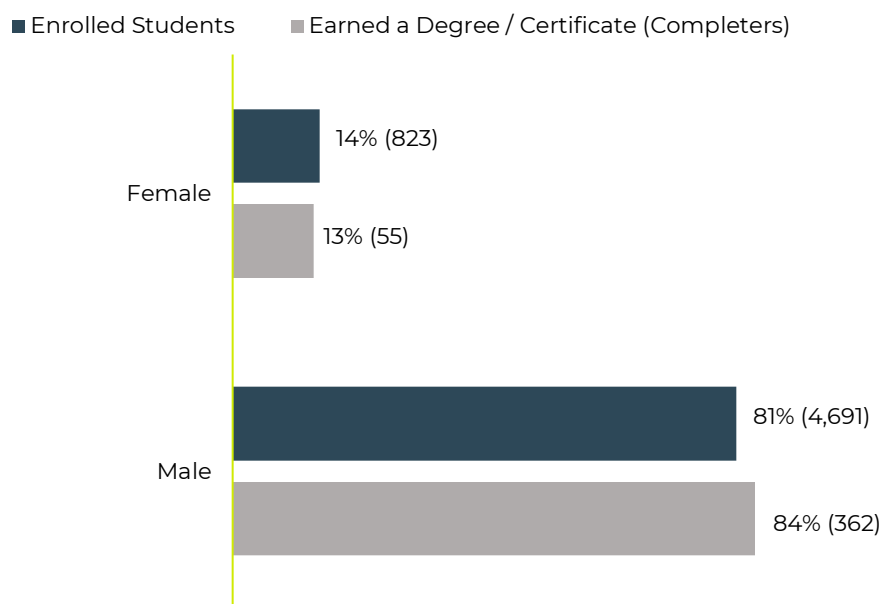
Source: IPEDS. Program Years 2021-22 to 2023-24 Annual Awards, by CIP Code, Bay Region Non-Community Colleges.

Demographic Profile of Students in Community College Advanced Manufacturing Programs

This sector profile also summarizes the demographics of community college students who enroll in and complete a degree or certificate in advanced manufacturing programs. Figures 4 through 6 present data on students by gender, race/ethnicity, and age. Enrolled students include all general admit students³ who were enrolled in at least one term of the selected year at a Bay Region community college. Completers represent the number of students who earned one or more of the following: Chancellor's Office approved certificate, associate degree, or non-credit awards.

On average, female students comprised 14% of enrollees and 13% of award earners, compared to 81% and 84% of male students, respectively. Students who identified as Hispanic (44%) and White (29%) represented the two largest racial/ethnic groups among enrolled students, and were also the largest groups that earned an award (37% and 29%, respectively). Students aged 20 to 24 were the most represented age group among those who enrolled (26%) and earned an award (33%). Students over 50 years old were the least represented age group among those who enrolled (8%). The figures below provide greater detail on the demographic profiles of students who enrolled in and completed advanced manufacturing programs in the Bay Region.

Figure 4: Gender of Students in Advanced Manufacturing Programs in the Bay Region (2022-23 to 2024-25)

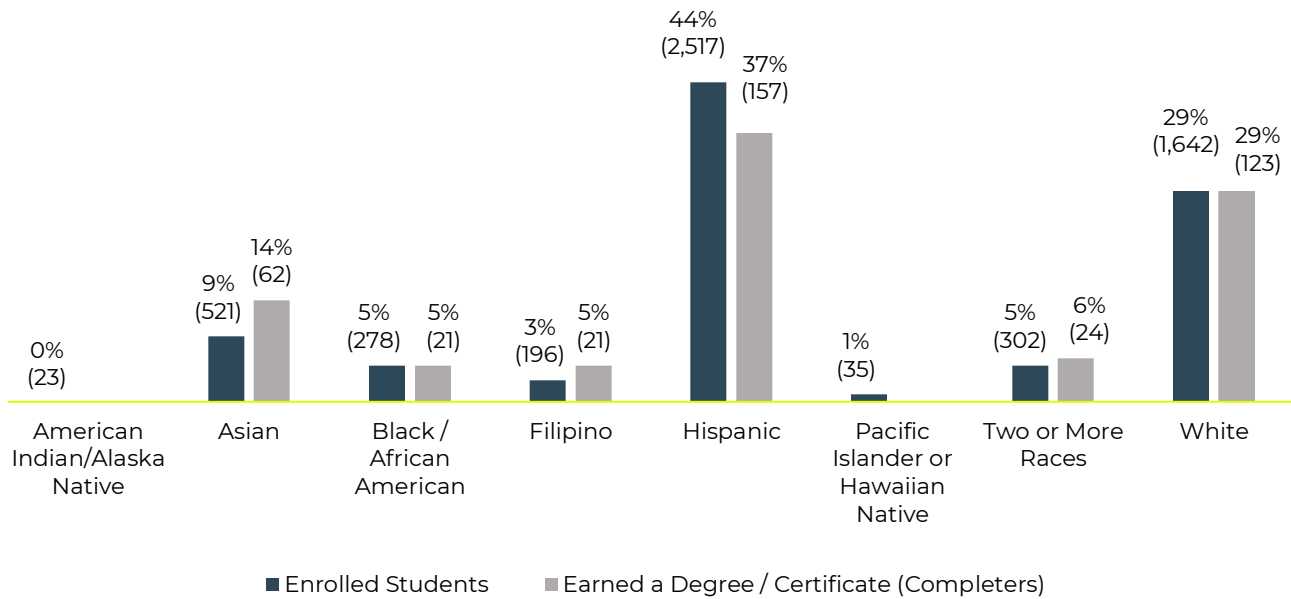


Note: May not total 100 percent due to non-respondent/non-binary.

Source: DataVista. Program Years 2022-23 to 2024-25 Programs, Bay Region Community Colleges.

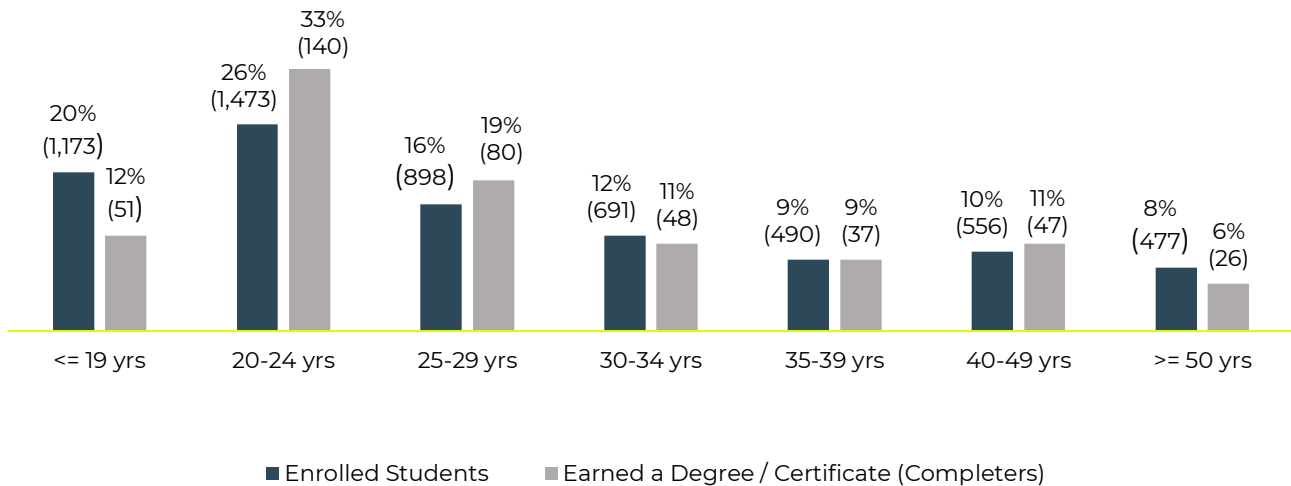
³ This term was updated in DataVista from "non-special admit students" used in previous reports. General admit students are defined as all students who enrolled as first-time in higher education general admit credit students in at least one primary term of the selected year with a minimal credit enrollment at the selected college who are tracked for one, two, three, four and six years from first term of enrollment. <https://datavista.cccco.edu/metrics/126>.

Figure 5: Race/Ethnicity of Students in Advanced Manufacturing Programs in the Bay Region (2022-23 to 2024-25)



Note: May not total 100 percent due to non-respondent/unknown/masked values.
Source: DataVista. Program Years 2022-23 to 2024-25 Programs, Bay Region Community Colleges.

Figure 6: Ages of Students in Advanced Manufacturing Programs in the Bay Region (2022-23 to 2024-25)



Note: May not total 100 percent due to non-respondent/unknown/masked values.
Source: DataVista. Program Years 2022-23 to 2024-25 Programs, Bay Region Community Colleges.

Beyond Labor Market and Supply Data: Insights and Ideas to Inspire Action

The Beyond Labor Market and Supply Data section is intended to provide additional context that helps explain the trends presented throughout the sector profile. To develop these insights, the Bay Region Center of Excellence collaborates with the Bay Area Community College Consortium (BACCC) Regional Directors, whose direct engagement with employers, colleges, and industry partners provides an on the ground perspective on the forces shaping each sector. For advanced manufacturing, Regional Director Mark Martin contributed insights on the current conditions, emerging trends, and potential areas of opportunity affecting advanced manufacturing in the Bay Area.

While manufacturing employment in the Bay Area is expected to remain flat over the next five years, this does not necessarily indicate a weakening manufacturing sector. Advanced manufacturing output continues to grow and the sector remains an important component of the Bay Area economy for two primary reasons: 1) manufacturing supports economic activity across a broad network of suppliers and service industries; and 2) rising productivity enables manufacturers to continuously expand economic output without necessarily increasing employment at the same rate.

Projected employment changes should also be considered alongside the substantial number of job openings within the sector. Although the advanced manufacturing occupations included in this report are projected to decline by approximately 2% between 2024 to 2029, they are still expected to generate 17,550 average annual job openings. Similarly, about 91% of these openings are replacement openings. For this reason, a sector or occupation can decline in total employment while still creating considerable hiring demand as workers retire, transfer to other occupations, or leave the workforce.

Importance of Manufacturing

Beyond direct factory hiring, advanced manufacturing acts as an economic anchor because it supports an extensive network of non-manufacturing supply and service partners, including wholesale trade and distribution, professional and technical services such as engineering design and industrial software, transportation and logistics, commercial equipment repair, and administrative and staffing services.

According to national research from the Economic Policy Institute (EPI),⁴ manufacturing has substantial employment linkages to other sectors of the economy. EPI estimates that a manufacturing job may support additional employment elsewhere in the economy, while a 2013 US Senate Joint Economic Committee report, citing research on local employment multipliers, similarly

⁴ “[Updated Employment Multipliers for the U.S. Economy](https://www.epi.org/publication/updated-employment-multipliers-for-the-u-s-economy),” Economic Policy Institute, January 2019, accessed October 1, 2026, <https://www.epi.org/publication/updated-employment-multipliers-for-the-u-s-economy>.

noted that jobs in high-tech or advanced manufacturing industries may support as many as 4.9 additional jobs.⁵ More recent estimates from the National Association of Manufacturers (NAM)⁶ find similar results. They estimate that every manufacturing worker is associated with five additional workers across the overall U.S. economy. Although these estimates are national rather than Bay Area specific, they demonstrate why manufacturing employment can have economic effects extending beyond jobs located directly within manufacturing establishments.

Growing Output Amid Workforce Change

While projected changes indicate a 2% contraction in advanced manufacturing pathway jobs between 2024 and 2029, this trend does not reflect a shrinking manufacturing footprint. California's manufacturing real GDP rose at an annualized growth rate of 3.2% from 2001-2024.⁷ And according to data from the Bureau of Economic Analysis (BEA),⁸ the Bay Area's manufacturing GDP tracked California's growth closely during the same period, despite periods of contraction during the dot-com bust, the Great Recession, and the post-COVID period.

This combination of expanding economic output and relatively flat employment suggests that manufacturers are producing more value without increasing employment at the same rate. This may reflect the use of advanced processes and equipment to produce complex products such as biomedical devices, aerospace components, semiconductor equipment and components, and electronics. These industries generate higher economic value with a smaller and more specialized workforce.

Recent national productivity data provide additional context for this pattern. According to the U.S. Bureau of Labor Statistics, manufacturing labor productivity increased by 2.0% in 2025 as manufacturing output increased by 1.1% while hours worked declined by 0.9%.⁹ These patterns show how manufacturers can increase production while using fewer labor hours, helping explain why employment growth may remain flat or decline even when manufacturing output remains significant.

Employment Across the Manufacturing Workforce

At the occupation level, several traditional production occupations are projected to experience employment decreases, while some technically oriented occupations are projected to grow. For example, the report projects growth for industrial machinery mechanics, semiconductor processing technicians, industrial engineering technologists and technicians, and aerospace engineering and

⁵ "Manufacturing Jobs for the Future," Joint Economic Committee, December 2013, accessed October 1, 2026, https://www.jec.senate.gov/public/_cache/files/a5c87e25-ff51-4b4f-9ced-2ee4b0bee12f/jec-manufacturing-report---final-combined-version.pdf.

⁶ "Facts About Manufacturing," National Association of Manufacturers, accessed October 1, 2026, <https://nam.org/mfgdata/facts-about-manufacturing-expanded>.

⁷ "Real Gross Domestic Product: Manufacturing (31-33) in California," Federal Reserve Bank of St. Louis, accessed October 1, 2026, <https://fred.stlouisfed.org/series/CAMANRGSP>.

⁸ U.S. Bureau of Economic Analysis. "CAGDP2 Gross domestic product (GDP) by county," accessed October 1, 2026. <https://apps.bea.gov/itable>.

⁹ "Productivity and Costs News Release, Table C1" U.S. Bureau of Labor Statistics, March 2026, accessed October 1, 2026. https://www.bls.gov/news.release/archives/prod2_03052026.htm

operations technologists and technicians. National BLS projections show a similar pattern¹⁰. Overall manufacturing employment is expected to change little over the decade, but some manufacturing industries and occupations are expected to grow, including industrial machinery mechanics. This pattern suggests that manufacturing employment may be evolving toward greater demand for workers who maintain, troubleshoot, program, inspect, and support increasingly complex manufacturing systems.

Automation and Technology Are Changing Manufacturing Work

Automation can change both the number of workers needed for particular production tasks and the skills required across the manufacturing workforce. Automated equipment still requires workers who can install, operate, maintain, troubleshoot, program, calibrate, and repair systems.

Deloitte's 2025 Smart Manufacturing and Operations Survey¹¹ shows that manufacturers are continuing to prioritize automation as part of their future operations. Among 600 manufacturing executives surveyed, 46% ranked process automation as a first or second priority investment over the next two years, while 37% ranked physical automation among their top two priorities. At the same time 35% identified adapting workers to the "Factory of the Future", including equipping workers with the skills and tools needed to work with advanced technology. These investments help show how technology adoption can reshape employment and skill requirements even as manufacturers continue to invest in production capacity and advanced technologies.

Aging Workforce Demographics and Continued Replacement Demand

An aging manufacturing workforce is one important factor contributing to continued replacement demand. Annual averages from the U.S. Bureau of Labor Statistics Current Population Survey (Table 18b) highlight a steep upward curve of US manufacturing workers approaching retirement.

Aging US Population - manufacturing workers aged 55+ made up:

- **2005:**¹² **15.8%** (2,563,000 (55+) / 16,253,000 mfg workers)
- **2015:**¹³ **23.4%** (3,593,000 / 15,338,000)
- **2025:**¹⁴ **25.2%** (3,820,000 / 15,134,000)

¹⁰ "Producing the Goods of the Future: Job Opportunities in Manufacturing," U.S. Bureau of Labor Statistics, May 2026, accessed October 1, 2026, <https://www.bls.gov/careeroutlook/2026/article/manufacturing.htm>.

¹¹ "2025 Smart Manufacturing and Operations Survey: Navigating Challenges to Implementation," Deloitte Insights, May 2025, accessed October 1, 2026, <https://www.deloitte.com/us/en/insights/industry/manufacturing-industrial-products/2025-smart-manufacturing-survey.html>.

¹² "Employed Persons in Nonagricultural Industries By Age, Sex, Race, And Hispanic or Latino Ethnicity (Table 14)," Bureau of Labor Statistics, accessed October 1, 2026, <https://www.bls.gov/cps/aa2005/cpsaat14.pdf>.

¹³ Ibid.

¹⁴ Ibid.

These numbers are for the US, but this national aging trend is mirrored in CA and regional data. According to the California Employment Development Department (EDD) Aging Workforce Report¹⁵, the share of manufacturing jobs in California held by workers aged 55+ rose from 12% in 1992 to 30% in 2022. This retirement wave is driving the 17,800 annual replacement openings in the Bay Area.

Connecting Educational Supply and Workforce Demand

The gap between regional middle-skill demand and educational supply represents both a challenge for employers and an economic mobility opportunity for community college students. Bay Area community colleges award an average of 820 degrees and certificates annually in programs aligned with advanced manufacturing careers. Middle-skill occupations, which directly require or benefit from community college education and training, account for a substantial number of average annual openings.

It is important to note that employers may also hire experienced workers, apprentices, workers trained by employers, individuals trained through other educational systems, and workers relocating or transferring occupations. While data shows that 820 awards meet only 11% of the sector's hiring needs (about 17,550 annual openings), this difference highlights the importance of continued collaboration among colleges and employers to evaluate whether existing programs have sufficient capacity, whether students are completing programs, and whether training is aligned with the occupations and skills experiencing the greatest demand.

Areas of Opportunity

To identify potential areas where community colleges can support the regional manufacturing economy, it is useful to focus on middle-skill manufacturing occupations that combine strong wages with significant annual hiring demand.

One metric to consider is a Regional Impact (RI) number (defined here as the annual wage for an occupation (hourly earnings x 2000 hours) by the number of job openings for that role. This metric estimates the total annual wage opportunity associated with each occupation. Table 11 shown below illustrates this, with *inspectors, testers, sorters, samplers, and weighers* and *first-line supervisors of production and operating workers* having the highest RI at \$91 and \$80 million respectively. These occupations may encourage further exploration to determine whether existing programs, courses, or related training opportunities could support the skills needed for these roles.

Beyond these occupations are several high impact career pathways for which community colleges already maintain established training programs, including industrial maintenance, electronics, machining, and welding. Colleges and regional partners can examine whether current training capacity and program locations align with projected workforce demand and regional industry

¹⁵ "[California's Aging Workforce Report](https://labormarketinfo.edd.ca.gov/Publications/Trend-Reports/californias-aging-workforce-report.pdf)," Employment Development Department, June 2023, accessed October 1, 2026, <https://labormarketinfo.edd.ca.gov/Publications/Trend-Reports/californias-aging-workforce-report.pdf>.

clusters. Aligning program locations with employer demand enables local residents to access training more easily and supports employment opportunities closer to where they live.

Table 11: Regional Impact for Occupations in Advanced Manufacturing

Occupation	Avg. Annual Openings	Median Hourly Earnings	Regional Impact (Annual wages x job openings)
Inspectors, Testers, Sorters, Samplers, and Weighers	1,690	\$27	\$91,260,000
First-Line Supervisors of Production and Operating Workers	1,050	\$38	\$79,800,000
Industrial Machinery Mechanics	540	\$39	\$42,120,000
Electrical and Electronic Engineering Technologists and Technicians	400	\$41	\$32,800,000
Machinists	480	\$30	\$28,800,000
Welders, Cutters, Solderers, and Brazers	490	\$29	\$28,420,000
Water and Wastewater Treatment Plant and System Operators*	220	\$50	\$22,000,000
Engineering Technologists and Technicians, Except Drafters, All Other	210	\$42	\$17,640,000
Computer Numerically Controlled Tool Operators	290	\$28	\$16,240,000

Recruiting to Address Workforce Needs

One opportunity to help address projected I middle-skill openings is to expand outreach and career access for groups that remain underrepresented in the manufacturing workforce. In the Bay Area, as well as across California and the United States, women remain substantially underrepresented in many manufacturing occupations¹⁶.

Although women are enrolled in manufacturing community college programs at higher rates than they are represented in the manufacturing workforce, they still account for only about 14% of Bay Area enrollees. This representation difference highlights an opportunity to expand awareness of manufacturing careers and strengthen pathways for women interested in middle-skill manufacturing occupations.

The Bay Area already has a regional Women in Manufacturing Skilled Trades (WIMST)¹⁷ initiative that works to help colleges and companies implement ways to recruit more women into manufacturing.

¹⁶ "Pathways to Equity," Institute for Women's Policy Research, 2016, accessed October 1, 2026, https://womenandgoodjobs.org/wp-content/uploads/2016/03/Middle-skills_layout-FINAL.pdf.

¹⁷ "Women in Manufacturing Skilled Trades (WIMST)," Bay Area Manufacturing Careers, accessed 1 Oct. 2026. bayareamanufacturingcareers.com/wimst.html.

Through cohort-based learning, structured mentorship, and direct career connections to regional employers, community colleges can broaden participation in manufacturing career pathways while expanding access to manufacturing careers.

Recruitment should also be considered alongside retention and advancement. Expanding the pool of individuals entering manufacturing will have a greater workforce impact when students have clear pathways from introductory training into certificates, degrees, apprenticeships, and employment into higher skilled technical roles.

Recommended Actions

To optimize workforce training pipelines and align community college resources with regional needs, colleges might consider the following actions:

- **Explore Training Opportunities for First-Line Supervisors:** Evaluate opportunities to construct training tracks for first-line supervisor roles (HR regulations, lean manufacturing concepts, OSHA, etc.), utilizing existing curriculum where possible.
- **Analyze Geographic Demand vs. Supply:** Regional workforce data often mask important subregional differences between employer demand and training capacity. Because graduates typically seek employment close to where they live, programs should be evaluated at the county or subregional level rather than across the Bay Area as a whole. Welding provides a useful example. Silicon Valley has a substantial manufacturing base, while public community college welding training is currently limited within the subregion. Evaluating occupation level demand alongside the geographic distribution of existing programs can help identify where expanded capacity, partnerships, or additional training options may be beneficial.
- **Support Established Cohort Models:** Provide continued operational support to sustain successful localized cohort structures that guide students through manufacturing trades. Core regional examples of these frameworks include:
 - The Foothill Semiconductor Engineering Apprenticeship¹⁸
 - The DVC Robotics Career Academy¹⁹
 - The De Anza Machining and CNC Program²⁰
- **Explore Expanding Bridge Programs and Funding Mechanisms:** Investigate methods to execute short-term technical bridge programs across a broader array of manufacturing disciplines to improve student readiness. This exploration should actively identify future funding streams by evaluating the frameworks of current regional bridge models, such as

¹⁸ "Semiconductor Engineering," Foothill College, accessed October 12, 2026, <https://foothill.edu/apprenticeships/trades/semiconductor-engineering.html>.

¹⁹ "Robotics Career Academy," Diablo Valley College, accessed October 12, 2026, <https://www.dvc.edu/academics/high-school-programs/career-academies/robotics-career-academy>.

²⁰ "Machining and CNC," De Anza College, last modified March 17, 2026, accessed October 12, 2026, <https://daweb2.deanza.edu/dmt/machining/>.

the SVAMP Grant Initiative Coalition²¹, the BART Transit Career Ladders Training (TCLT)²² framework, and the Ohlone Semiconductor Skills Bridge Academy (SSBA).²³

- **Further Develop Career Exposure Methods:** Cultivate and advance exploratory methods designed to introduce individuals to skilled trades professions and assist them in identifying their technical interests. A central avenue for this outreach involves advancing platforms like the interactive Intro to Skilled Trades Program(i2ST).²⁴

Overall, the projected decline in advanced manufacturing should not be interpreted as a signal to reduce manufacturing education and training. The data instead point to a sector experiencing occupational restructuring. Some traditional production roles are declining as productivity and technology change how items are produced, while technically oriented occupations remain stable or grow. At the same time, substantial replacement demand means employers will continue to need new workers even in occupations with little employment growth. Together, these trends highlight opportunities for continued collaboration among industry, education, and workforce partners as the region adapts to changing technologies, skill requirements, and workforce needs.

²¹ "Ohlone College Joins Silicon Valley Advanced Manufacturing Partnership (SVAMP) to Strengthen...", Ohlone College, accessed October 12, 2026, <https://www.ohlone.edu/article/news/ohlone-college-joins-silicon-valley-advanced-manufacturing-partnership-svamp-strengthen>.

²² "Internships & Career Development," Bay Area Rapid Transit (BART), accessed October 12, 2026, <https://www.bart.gov/about/jobs/training>.

²³ "SSBA," Ohlone College, accessed October 12, 2026, <https://www.ohlone.edu/ssba>.

²⁴ "Intro to the Skilled Trades (i2ST) Program," Bay Area Manufacturing Careers, accessed October 12, 2026, <https://bayareamanufacturingcareers.com/intro-to-skilled-trades-program.html>.

Appendix A: Methodology

The Bay Region COE selected the occupations in this profile by examining job descriptions and skills listed in O*Net. Labor market and job postings data was sourced from Lightcast [data 2026.1]. Online job postings included all unique job postings from January 2025 to December 2025 in the 12-county Bay Region for occupations in the advanced manufacturing pathways specified in this report.

In addition, to evaluate industry data, the advanced manufacturing sector included industries classified under North American Industry Classification System (NAICS) six-digit codes in Table 11. The COE selected these NAICS codes using inverse staffing patterns to determine the industries in which the occupations in this report were employed, and included industries related to advanced manufacturing (see Table 11). Please note that these NAICS codes include industries with more than 1% of the occupation employed in the industry.

Table 11: NAICS codes for the Advanced Manufacturing Sector

NAICS	Description
311225	Fats and Oils Refining and Blending
311314	Cane Sugar Manufacturing
311340	Nonchocolate Confectionery Manufacturing
311351	Chocolate and Confectionery Manufacturing from Cacao Beans
311352	Confectionery Manufacturing from Purchased Chocolate
311411	Frozen Fruit, Juice, and Vegetable Manufacturing
311412	Frozen Specialty Food Manufacturing
311421	Fruit and Vegetable Canning
311423	Dried and Dehydrated Food Manufacturing
311511	Fluid Milk Manufacturing
311513	Cheese Manufacturing
311520	Ice Cream and Frozen Dessert Manufacturing
311612	Meat Processed from Carcasses
311821	Cookie and Cracker Manufacturing
311830	Tortilla Manufacturing
311919	Other Snack Food Manufacturing
311920	Coffee and Tea Manufacturing
311930	Flavoring Syrup and Concentrate Manufacturing
311941	Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing
311942	Spice and Extract Manufacturing
311991	Perishable Prepared Food Manufacturing

NAICS	Description
311999	All Other Miscellaneous Food Manufacturing
312111	Soft Drink Manufacturing
312120	Breweries
312130	Wineries
315250	Cut and Sew Apparel Manufacturing (except Contractors)
321113	Sawmills
321215	Engineered Wood Member Manufacturing
321911	Wood Window and Door Manufacturing
321920	Wood Container and Pallet Manufacturing
321992	Prefabricated Wood Building Manufacturing
321999	All Other Miscellaneous Wood Product Manufacturing
322211	Corrugated and Solid Fiber Box Manufacturing
325120	Industrial Gas Manufacturing
325180	Other Basic Inorganic Chemical Manufacturing
325199	All Other Basic Organic Chemical Manufacturing
325211	Plastics Material and Resin Manufacturing
325411	Medicinal and Botanical Manufacturing
325412	Pharmaceutical Preparation Manufacturing
325413	In-Vitro Diagnostic Substance Manufacturing
325414	Biological Product (except Diagnostic) Manufacturing
325520	Adhesive Manufacturing
325620	Toilet Preparation Manufacturing
325920	Explosives Manufacturing
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing
326111	Plastics Bag and Pouch Manufacturing
326150	Urethane and Other Foam Product (except Polystyrene) Manufacturing
326160	Plastics Bottle Manufacturing
326199	All Other Plastics Product Manufacturing
327110	Pottery, Ceramics, and Plumbing Fixture Manufacturing
327120	Clay Building Material and Refractories Manufacturing
327215	Glass Product Manufacturing Made of Purchased Glass
327320	Ready-Mix Concrete Manufacturing
327331	Concrete Block and Brick Manufacturing

NAICS	Description
327390	Other Concrete Product Manufacturing
327420	Gypsum Product Manufacturing
327991	Cut Stone and Stone Product Manufacturing
332114	Custom Roll Forming
332312	Fabricated Structural Metal Manufacturing
332321	Metal Window and Door Manufacturing
332322	Sheet Metal Work Manufacturing
332323	Ornamental and Architectural Metal Work Manufacturing
332431	Metal Can Manufacturing
332613	Spring Manufacturing
332721	Precision Turned Product Manufacturing
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing
333111	Farm Machinery and Equipment Manufacturing
333241	Food Product Machinery Manufacturing
333242	Semiconductor Machinery Manufacturing
333248	All Other Industrial Machinery Manufacturing
333310	Commercial and Service Industry Machinery Manufacturing
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing
333517	Machine Tool Manufacturing
333912	Air and Gas Compressor Manufacturing
333914	Measuring, Dispensing, and Other Pumping Equipment Manufacturing
333992	Welding and Soldering Equipment Manufacturing
333993	Packaging Machinery Manufacturing
333998	All Other Miscellaneous General Purpose Machinery Manufacturing
334111	Electronic Computer Manufacturing
334112	Computer Storage Device Manufacturing
334118	Computer Terminal and Other Computer Peripheral Equipment Manufacturing
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
334310	Audio and Video Equipment Manufacturing
334412	Bare Printed Circuit Board Manufacturing

NAICS	Description
334413	Semiconductor and Related Device Manufacturing
334416	Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing
334417	Electronic Connector Manufacturing
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing
334419	Other Electronic Component Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
334516	Analytical Laboratory Instrument Manufacturing
334519	Other Measuring and Controlling Device Manufacturing
334610	Manufacturing and Reproducing Magnetic and Optical Media
335132	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing
335210	Small Electrical Appliance Manufacturing
335311	Power, Distribution, and Specialty Transformer Manufacturing
335312	Motor and Generator Manufacturing
335313	Switchgear and Switchboard Apparatus Manufacturing
335314	Relay and Industrial Control Manufacturing
335910	Battery Manufacturing
335921	Fiber Optic Cable Manufacturing
335929	Other Communication and Energy Wire Manufacturing
335931	Current-Carrying Wiring Device Manufacturing
335932	Noncurrent-Carrying Wiring Device Manufacturing
335991	Carbon and Graphite Product Manufacturing
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing
336110	Automobile and Light Duty Motor Vehicle Manufacturing
336120	Heavy Duty Truck Manufacturing
336211	Motor Vehicle Body Manufacturing
336320	Motor Vehicle Electrical and Electronic Equipment Manufacturing
336370	Motor Vehicle Metal Stamping
336390	Other Motor Vehicle Parts Manufacturing
336411	Aircraft Manufacturing

NAICS	Description
336412	Aircraft Engine and Engine Parts Manufacturing
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing
336414	Guided Missile and Space Vehicle Manufacturing
336991	Motorcycle, Bicycle, and Parts Manufacturing
336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing
337110	Wood Kitchen Cabinet and Countertop Manufacturing
337122	Non-upholstered Wood Household Furniture Manufacturing
337212	Custom Architectural Woodwork and Millwork Manufacturing
337215	Showcase, Partition, Shelving, and Locker Manufacturing
339112	Surgical and Medical Instrument Manufacturing
339113	Surgical Appliance and Supplies Manufacturing
339115	Ophthalmic Goods Manufacturing
339910	Jewelry and Silverware Manufacturing
339920	Sporting and Athletic Goods Manufacturing
339950	Sign Manufacturing
339991	Gasket, Packing, and Sealing Device Manufacturing
339992	Musical Instrument Manufacturing
339999	All Other Miscellaneous Manufacturing

The Bay Region COE selected advanced manufacturing programs based on DataVista's Mapping of Taxonomy of Program (TOP) Codes to Sectors.²⁵ To evaluate active or approved programs in Bay Region community colleges we examined data reported to the California Community Colleges Chancellor's Office Curriculum Inventory (COCI). This report included active or approved programs prior to October 2024. Educational supply data was retrieved from Data Mart for TOP data and Integrated Postsecondary Education Data System (IPEDS) for CIP data. The total number of degrees awarded for a given TOP or CIP code was calculated as a three-year average.

²⁵ "CTE TOP Codes to Sectors," WestEd, DataVista, California Community Colleges Chancellor's Office, published May 7, 2026, accessed October 12, 2026, <https://datavista.cccco.edu/resources/8>.

Definitions

Average Annual Job Openings: In Lightcast, average annual job openings refer to the estimated number of job openings in a given occupation or group of occupations within a specific geographic area during the course of a year. When calculating this metric for more than a year, the average across those years is determined by adding the annual job openings over the period and dividing the total by the number of years (e.g., for a five-year period, this means adding the total openings across those five years and dividing that number by 5).

This metric is calculated based on:

- New Growth: Openings that arise due to the creation of new jobs as a result of industry or economic growth.
- Replacement Needs: Openings that occur because of workers leaving the occupation (e.g., due to retirement, career changes, or other factors).

Together, these components provide a comprehensive view of the total demand for workers in a specific role or field each year.

Average Annual Replacement Jobs: Average annual projected number of replacement job openings during 2024-2029.

CIP code: The Classification of Instructional Programs (CIP) is a taxonomic coding scheme, developed by the U.S. Department of Education's National Center for Education Statistics (NCES), used to classify and categorize academic programs for federal surveys and reporting of institutional data. Program data from CIP codes comes from the Integrated Postsecondary Education Data System (IPEDS). CIP codes are used to facilitate the alignment of similar programs offered by 2- and 4-year postsecondary institutions with the needs of the labor market.

Living wage: The living wage is the hourly rate that an individual in a household must earn to support themselves and/or their family, working full-time, or 2,080 hours per year. In the Bay Region the living wage is calculated as \$46 per hour for one adult and school-aged child using the average median wages across the 12 counties in the Bay Region (Table 12).²⁶

Table 12: Living Wage for an Adult + School-Aged Child by County

County	Living Wage	County	Living Wage
Alameda County	\$46	San Francisco County	\$50
Contra Costa County	\$46	San Mateo County	\$57
Marin County	\$55	Santa Clara County	\$51
Monterey County	\$44	Santa Cruz County	\$59
Napa County	\$44	Solano County	\$39
San Benito County	\$42	Sonoma County	\$42

²⁶ [Self-Sufficiency Standard](https://selfsufficiencystandard.org/California), Center for Women's Welfare, University of Washington, 2023, accessed May 9, 2025, <https://selfsufficiencystandard.org/California>.

NAICS codes: North American Industry Classification System (NAICS) codes are used to organize and categorize industries within the job market for this sector. A single two-digit NAICS code can represent multiple sub-sectors and industry groups within the broader sector.

Replacements as Percent of Openings: Percent of replacements of all job openings during 2024-2029.

Skill Level: Occupations are categorized into three skill levels: below middle-skill, middle-skill, and above middle-skill jobs. Classification is based on the typical entry-level education below.

Table 13: Skill Level Definition

Skill Level	Entry-Level Education
Below Middle-Skill	No formal education required
	High school diploma
Middle-Skill	Some college, no award
	Postsecondary certificate (non-degree award)
	Associate degree
	Bachelor’s degree (selected occupations where ~33% or greater of positions are held by workers with less than a bachelor’s degree)
Above Middle-Skill	Bachelor’s degree (All other occupations not identified as middle-skill)
	Advanced degree

TOP code: The Taxonomy of Programs (TOP) is a system of codes used by the California Community College Chancellor’s Office to compare differently named academic programs with similar outcomes across community colleges. Programs and courses offered by Community Colleges are assigned a TOP code to identify similar programs and their alignment with the labor market.

Unique Job Postings: Lightcast’s deduplication process involves identifying duplicate job postings and counting them as a unique posting. The unique job posting count is the number of postings after the deduplication process has taken place. For example, multiple postings could list the same job, from the same company, and in the same region, and these multiple postings would be reduced to one unique job posting.

Sources

- California Community Colleges Chancellor’s Office Curriculum Inventory (COCI)
- Chancellor’s Office Management Information Systems (MIS) Data Mart
- DataVista
- Integrated Postsecondary Education Data System (IPEDS)
- Lightcast
- O*Net Online

Contact

For more information about this report, please contact:

- **Marcela Reyes, Director**
marcela@baccc.net or (831) 219-8875
- **Liza Chavac, Assistant Director**
liza@baccc.net or (831) 291-5895
- **Yumi Huang, Research Analyst**
yumi@baccc.net or (831) 275-0043
- **Mark Martin, BACCC Advanced Manufacturing Sector Director**
mark.martin@design4x.com or (650) 248-7728

The Bay Region COE would also like to acknowledge the expertise and support of Priscilla Fernandez, Independent Research Consultant, in the development of this report.



CENTER OF EXCELLENCE
FOR LABOR MARKET RESEARCH
BAY AREA



POWERED BY



California
Community
Colleges