**Maker Technology Occupations**

**Labor Market Information Report**

Prepared by the San Francisco Bay Center of Excellence

for Labor Market Research

February 2018

# Recommendation

Based on all available data, there appears to be a large undersupply of Maker Technology workers compared to the demand for this cluster of occupations in the Bay region and the North Bay sub-region. The annual gap between demand and supply is about 4,900 in the region and about 670 in the North Bay sub-region.

However, labor market information (LMI) is difficult to determine for this type of program. The LMI application submitted by Solano College states the following: “This program is an overview of basic design of manufacturing skills and concepts that will allow students to experiment with equipment in the SCC Maker Space lab…The skills students learn are building blocks to higher-level job skills that are in demand in the careers of Advanced Manufacturing, Drafting and Design, Electronics, Maintenance Technology, Computer Science, Graphic Arts, Welding and other related fields. This certificate is meant to support existing Solano Community College programs...”

Since the program is an overview of “basic design of manufacturing skills and concepts” with the purpose of allowing students to experiment and then possibly advance to higher-level skilled jobs across different fields and in different program areas, it is hard to know which jobs students would be qualified to enter and what other programs in the region are training for those jobs.

This report also provides student outcomes data on employment and earnings for Manufacturing and Industrial Technology programs (TOP 0956.00) in the region and state. It is recommended that this data be reviewed to better understand how outcomes for Solano College students taking courses on this TOP code compare to potentially similar programs at colleges in the state, region and sub-region, as well as to outcomes across all programs at Solano College and in the region.

# Introduction

This report profiles Maker Technology occupations in the 12 county Bay region and the North Bay sub-region (Marin, Napa, Solano and Sonoma counties) for a proposed new Maker Technology program at Solano College.

* **Drafters, All Other (SOC 17-3019)**: All drafters not listed separately.

*Entry-Level Educational Requirement:* *Associate Degree*

*Training Requirement:* *None*

*Percentage of Community College Award Holders or Some Postsecondary Coursework:* 60%

* **Electrical and Electronic Engineering Technicians (SOC 17-3023)** Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, calibrate, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions.

*Entry-Level Educational Requirement:* *Associate Degree*

*Training Requirement:* *None*

*Percentage of Community College Award Holders or Some Postsecondary Coursework:* 56%

* **Electrical and Electronics Repairers, Commercial and Industrial Equipment (SOC 49-2094)**: Repair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas.

*Entry-Level Educational Requirement:* *Postsecondary Nondegree Award*

*Training Requirement:* *Long-term on-the-job training*

*Percentage of Community College Award Holders or Some Postsecondary Coursework:* 51%

* **Maintenance and Repair Workers, General (SOC 49-9071)**: Perform work involving the skills of two or more maintenance or craft occupations to keep machines, mechanical equipment, or the structure of 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.

*Entry-Level Educational Requirement:* *High school diploma or equivalent*

*Training Requirement:* *Long-term on-the-job training*

*Percentage of Community College Award Holders or Some Postsecondary Coursework:* 38%

* **Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic (SOC 51-4012)**: Develop programs to control machining or processing of metal or plastic parts by automatic machine tools, equipment, or systems.

*Entry-Level Educational Requirement:* *High school diploma or equivalent*

*Training Requirement:* *Long-term on-the-job training*

*Percentage of Community College Award Holders or Some Postsecondary Coursework:* 46%

# Occupational Demand

**Table 1. Employment Outlook for Maker Technology Occupations in Bay Region**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation | 2016 Jobs | 2021 Jobs | 5-Yr Change | 5-Yr % Change | 5-year Open-ings | Annual Open-ings | 10% Hrly Wage | Median Hrly Wage |
| Drafters, All Other | 388 | 414 | 26 | 7% | 194 | 39 | $20.34 | $28.17 |
| Electrical & Electronics Engineering Technicians | 11,023 | 11,039 | 16 | 0% | 4,894 | 979 | $18.77 | $31.29 |
| Electrical & Electronics Repairers, Commercial and Industrial Equipment | 1,858 | 1,939 | 81 | 4% | 896 | 179 | $16.79 | $32.09 |
| Maintenance & Repair Workers, General | 31,130 | 33,952 | 2,822 | 9% | 18,280 | 3,656 | $12.70 | $21.86 |
| Computer Numerically Controlled Machine Tool Programmers, Metal & Plastic | 591 | 655 | 64 | 11% | 368 | 74 | $19.84 | $32.28 |
| **Total** | **44,991** | **47,999** | **3,008** | **7%** | **24,632** | **4,926** | **$14.51**  | **$24.79**  |

*Source: EMSI 2017.4*

**Bay Region** includes Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma Counties

**Table 2. Employment Outlook for Maker Technology Occupations in North Bay Sub-Region**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation | 2016 Jobs | 2021 Jobs | 5-Yr Change | 5-Yr % Change | 5-year Open-ings | Annual Open-ings | 10% Hrly Wage | Median Hrly Wage |
| Drafters, All Other | 41 | 42 | 1 | 2% | 19 | 4 | $20.07 | $27.78 |
| Electrical & Electronics Engineering Technicians | 438 | 454 | 16 | 4% | 205 | 41 | $20.96 | $34.41 |
| Electrical & Electronics Repairers, Commercial and Industrial Equipment | 323 | 329 | 6 | 2% | 149 | 30 | $20.56 | $33.58 |
| Maintenance & Repair Workers, General | 5,187 | 5,591 | 404 | 8% | 2,967 | 593 | $12.56 | $21.54 |
| Computer Numerically Controlled Machine Tool Programmers, Metal & Plastic | 44 | 51 | 7 | 16% | 29 | 6 | $17.05 | $28.77 |
| **Total** | **6,034** | **6,468** | **434** | **7%** | **3,370** | **674** | **$13.68**  | **$23.22**  |

*Source: EMSI 2017.4***North Bay Sub-Region** includes Marin, Napa, Solano and Sonoma counties

### Job Postings in Bay Region and North Bay Sub-Region

**Table 3. Number of Job Postings by Occupation for latest 12 months (Jan 2017 – Dec 2017)**

|  |  |  |
| --- | --- | --- |
| Occupation | Bay Region | North Bay |
| Maintenance & Repair Workers, General (49-9071.00) | 7,841 | 1,285 |
| Electronics Engineering Technicians (17-3023.01) | 1,004 | 68 |
| Drafters, All Other (17-3019.00) | 309 | 51 |
| Computer Numerically Controlled Machine Tool Programmers, Metal & Plastic (51-4012.00) | 105 | 3 |
| Electrical & Electronics Repairers, Commercial & Industrial Equipment (49-2094.00) | 68 | 13 |
| Electrical Engineering Technicians (17-3023.03) | 49 | 1 |
| **Total** | **9,376** | **1,421** |

*Source: Burning Glass*

**Table 4. Top Job Titles for Maker Technology Occupations for latest 12 months (Jan 2017 – Dec 2017)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Common Title | Bay Region | North Bay |  | Common Title | Bay Region | North Bay |
| Maintenance Technician | 1,890 | 326 |  | Maintenance | 99 | 18 |
| Service Technician | 942 | 142 |  | Facilities Maintenance Technician | 87 | 16 |
| Field Service Technician | 587 | 59 |  | Instrumentation Technician | 85 | 7 |
| Test Technician | 304 | 9 |  | CNC Programmer | 80 | 2 |
| Facilities Technician | 291 | 27 |  | Facilities Engineer | 76 | 2 |
| Maintenance Worker | 265 | 61 |  | Facilities Assistant | 74 | 8 |
| Maintenance Engineer | 264 | 70 |  | Maintenance Person | 73 | 13 |
| Technician | 246 | 62 |  | Cad Drafter | 68 | 16 |
| Mechanic | 177 | 33 |  | Maintenance Specialist | 60 | 15 |
| Electronics Technician | 171 | 20 |  | Autocad Drafter | 58 | 25 |
| Engineering Technician | 170 | 14 |  | Engineer | 54 | 14 |
| Repair Technician | 162 | 38 |  | Installation Technician | 46 | 9 |
| Field Service Engineer | 143 | 9 |  | Calibration Technician | 45 | 7 |
| Equipment Technician | 142 | 15 |  | Building Maintenance Worker | 43 | 6 |
| Maintenance Mechanic | 105 | 25 |  | Building Engineer | 36 | 2 |

*Source: Burning Glass*

# Industry Concentration

**Table 5a. Industries hiring Maker Technology Workers in Bay Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Industry – 4 Digit NAICS (No. American Industry Classification) Codes** | **Jobs in Industry (2016)** | **Jobs in Industry (2021)** | **% Change (2016-21)** | **% in Industry (2016)** |
| Computer and Electronic Product Manufacturing (334) | 7,542 | 7,249 |  (4%) | 16.7% |
| Real Estate (531) | 6,438 | 6,974 | 8% | 14.4% |
| Local Government (903) | 4,311 | 4,536 | 5% | 9.6% |
| Professional, Scientific, and Technical Services (541) | 3,290 | 3,688 | 12% | 7.3% |
| Accommodation (721) | 2,302 | 2,449 | 6% | 5.1% |
| State Government (902) | 1,633 | 1,864 | 14% | 3.6% |
| Religious, Grantmaking, Civic, Professional & Similar Organizations (813) | 1,357 | 1,429 | 5% | 3.0% |
| Educational Services (611) | 1,338 | 1,519 | 14% | 3.0% |
| Administrative and Support Services (561) | 1,318 | 1,472 | 12% | 2.9% |
| Nursing and Residential Care Facilities (623) | 1,267 | 1,439 | 14% | 2.8% |
| Merchant Wholesalers, Durable Goods (423) | 997 | 1,035 | 4% | 2.2% |
| Social Assistance (624) | 861 | 991 | 15% | 1.9% |
| Federal Government (901) | 732 | 685 |  (6%) | 1.6% |
| Specialty Trade Contractors (238) | 672 | 753 | 12% | 1.5% |
| Machinery Manufacturing (333) | 633 | 675 | 7% | 1.4% |

*Source: EMSI 2017.4*

**Table 5b. Industries hiring Maker Technology Workers in North Bay Sub-Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Industry – 4 Digit NAICS (No. American Industry Classification) Codes** | **Jobs in Industry (2016)** | **Jobs in Industry (2021)** | **% Change (2016-21)** | **% in Industry (2016)** |
| Real Estate (531) | 937 | 999 | 7% | 15.6% |
| Local Government (903) | 844 | 877 | 4% | 13.8% |
| Accommodation (721) | 457 | 502 | 10% | 7.6% |
| Nursing and Residential Care Facilities (623) | 265 | 300 | 13% | 4.4% |
| Beverage and Tobacco Product Manufacturing (312) | 209 | 225 | 8% | 3.5% |
| Computer and Electronic Product Manufacturing (334) | 205 | 209 | 2% | 3.4% |
| Religious, Grantmaking, Civic, Professional & Similar Organizations (813) | 198 | 211 | 7% | 3.3% |
| Professional, Scientific, and Technical Services (541) | 193 | 198 | 3% | 3.2% |
| State Government (902) | 184 | 206 | 12% | 3.0% |
| Chemical Manufacturing (325) | 165 | 210 | 27% | 2.8% |
| Administrative and Support Services (561) | 152 | 157 | 3% | 2.5% |
| Food Manufacturing (311) | 151 | 176 | 17% | 2.5% |
| Social Assistance (624) | 147 | 171 | 16% | 2.4% |
| Amusement, Gambling, and Recreation Industries (713) | 128 | 143 | 12% | 2.1% |
| Specialty Trade Contractors (238) | 123 | 133 | 8% | 2.0% |

*Source: EMSI 2017.4*

**Table 6. Top Employers Posting Maker Technology Occupations in Bay Region and North Bay for latest 12 months (Jan 2017 – Dec 2017)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Employer** | **Bay** | **Employer** | **Bay** |  | **Employer** | **North Bay** |
| Marriott International Inc | 171 | Fpi Management | 45 |  | E & J Gallo Winery | 51 |
| Tesla Motors | 115 | MV Transportation, Inc. | 44 |  | Marriott International Inc | 25 |
| The Home Depot Inc | 82 | The John Stewart Company | 44 |  | The Home Depot Inc | 22 |
| Avalonbay Communities Inc | 68 | McDonald's | 41 |  | Coca-Cola Enterprises Inc. | 15 |
| Sears | 64 | Essex Property Trust | 39 |  | Interstate Hotels & Resorts | 15 |
| Alliance Residential Company | 60 | Hilton Hotel Corporation | 36 |  | MV Transportation, Inc. | 15 |
| Dignity Health | 56 | Agilent Technologies, Inc. | 33 |  | Sears | 15 |
| Cbre | 54 | UC San Diego | 33 |  | Toys"R"Us, Inc | 11 |
| E & J Gallo Winery | 52 | Johnson Controls Inc | 32 |  | Whole Foods Market, Inc. | 11 |
| Equity Residential | 52 | Interstate Hotels & Resorts | 31 |  | Alliance Residential Company | 10 |
| Toys"R"Us, Inc | 52 | Jones Lang Lasalle Inc | 31 |  | Hilton Hotel Corporation | 10 |
| Essex Junction Schools | 50 | Apple Inc. | 30 |  | Hyatt | 10 |
| Whole Foods Market, Inc. | 49 | AutoNation | 27 |  | Penske | 10 |

*Source: Burning Glass*

# Educational Supply

On the supply side, for Manufacturing and Industrial Technology (TOP 0956.00), there are two community colleges in the Bay region issuing 15 awards and one other educational postsecondary institution issuing three awards. In the North Bay sub-region there are two community colleges with programs on TOP 0956.00, but neither college has issued awards.

**Table 7. Manufacturing and Industrial Technology Programs (TOP 0956.00) or Industrial and Product Design (CIP 50.0404) in the Bay Region**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| College | Sub-Region | CC Headcount | Associate Degrees | Certificates or Other Credit Awards | Total Awards |
| Chabot Hayward | East Bay | 316 | 0 | 0 | 0 |
| DeAnza | Silicon Valley | 357 | 4 | 10 | 14 |
| Diablo Valley | East Bay | 12 | 0 | 0 | 0 |
| San Francisco | Mid-Peninsula | on another TOP | 0 | 1 | 1 |
| San Jose | Silicon Valley | 92 | 0 | 0 | 0 |
| Santa Rosa | North Bay | 287 | 0 | 0 | 0 |
| Solano | North Bay | 99 | 0 | 0 | 0 |
| Academy of Art University | Mid-Peninsula | n/a | 3 | 0 | 3 |
| **Total Bay Region** | **1,163** | **7** | **11** | **18** |
| **Total North Bay Sub-Region** | **386** | **0** | **0** | **0** |

# *Sources: IPEDS, Data Mart and Launchboard*

NOTE: For Community Colleges, the annual average for Associate Degrees and Certificates is 2014-17. There appears to be no programs at Other Educational Postsecondary Institutes based on a crosswalk of TOP to CIP codes. Headcount is for 2015-16. For the other educational postsecondary institute, the annual average for awards is 2013-16 from IPEDS.

# Gap Analysis

The labor market gap is significant in the Bay region for this cluster of occupation with total annual openings of 4,926 and annual supply of 18 awards. This represents an annual undersupply of 4,908 students. In the North Bay sub-region, there is also a large gap with total annual openings of 674 and no awards, for an annual undersupply of 674.

# Student Outcomes

Student Outcomes data from Launchboard is available for students who took courses on TOP 0956.00 – Manufacturing and Industrial Technology. Solano College’s outcomes are higher for each of the four employment metrics compared to the average student outcomes for the Bay Region colleges who have Manufacturing and Industrial Technology programs.

**Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0956.00 – Manufacturing and Industrial Technology**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **2014-15** | **Bay Region (All Programs)** | **Solano College (All Programs)** | **State (0956.00)** | **Bay Region (0956.00)** | **North Bay Sub-Region (0956.00)** | **Solano College(0956.00)** | **Top Colleges on TOP 0956.00 Manufacturing & Industrial Tech in Bay Region** |
| % Employed Four Quarters After Exit | 68% | 67% | 73% | 74% | 70% | 93% | Solano | 93% |
| Median Earnings Two Quarters After Exit | $12,640 | $7,615 | $10,595 | $13,375 | $10,200 | $14,020 | Chabot | $14,580 |
| Median % Change in Earnings | 37% | 54% | 52% | 43% | 25% | 106% | Solano | 106% |
| % of Students Earning a Living Wage | 51% | 44% | 64% | 75% | 59% | 90% | Solano | 90% |

 *Source: Launchboard*

# Skills, Certificates and Education

**Table 9. Top Skills for Maker Technology Occupations in Bay Region (Jan 2017 – Dec 2017)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Skill** | **Postings** | **Skill** | **Postings** | **Skill** | **Postings** |
| Repair | 5,775 | Technical Support | 513 | Apartment Maintenance | 284 |
| Plumbing | 2,359 | Welding | 483 | Boilers | 277 |
| Inspection | 1,879 | Switches | 455 | Electrical Work | 268 |
| HVAC | 1,791 | Customer Contact | 446 | Oscilloscopes | 259 |
| Painting | 1,504 | Drywall | 439 | Equipment Maintenance | 257 |
| Carpentry | 1,410 | Programmable Logic Controller (PLC) Programming | 399 | Equipment Repair | 247 |
| Cleaning | 1,264 | Electrical Systems | 393 | Microsoft Powerpoint | 245 |
| Customer Service | 988 | Calibration | 388 | Data Entry | 235 |
| Microsoft Office | 951 | Microsoft Word | 385 | Good Manufacturing Practices (GMP) | 235 |
| Scheduling | 947 | Wiring | 361 | AutoCAD | 224 |
| Microsoft Excel | 932 | Property Management | 358 | Staff Management | 220 |
| Hand Tools | 853 | Supervisory Skills | 357 | Printers | 216 |
| Machinery | 723 | Forklift Operation | 355 | Building Codes | 211 |
| Schematic Diagrams | 713 | Appliance Repair | 334 | Technical Training | 208 |
| Power Tools | 688 | Project Management | 325 | Microsoft Outlook | 205 |
| Test Equipment | 652 | Soldering | 323 | Asset Protection | 203 |
| Occupational Health & Safety | 593 | Sales | 314 | Masonry | 200 |
| Facility Maintenance | 585 | Budgeting | 288 | Packaging | 200 |

*Source: Burning Glass*

**Table 10. Top Certifications for Maker Technology Occupations in Bay Region**

Note: 86% of records have been excluded because they do not include a certification. As a result, the chart below may not be representative of the full sample.

|  |  |  |  |
| --- | --- | --- | --- |
| **Certification** | **Postings** | **Certification** | **Postings** |
| Environmental Protection Agency Certification | 164 | Electrician Certification | 34 |
| Commercial Driver's License | 156 | Hvac Technician Certification (e.g. EPA 608) | 33 |
| Certified A+ Technician | 91 | Airframe and Powerplant (A and P) Certification | 31 |
| Automotive Service Excellence (ASE) Certification | 90 | CDL Class A | 31 |
| Refrigeration Technician Certification (e.g. CFC Type 2) | 79 | CA Drivers License Class B | 26 |
| Forklift Operator Certification | 50 | Network+ Certified | 26 |
| First Aid CPR AED | 44 | GIAC Certified Project Manager | 25 |
| Security Clearance | 41 | Wastewater Treatment Plant Operator | 23 |
| CDL Class C | 40 | Project Management Certification (e.g. PMP) | 19 |

*Source: Burning Glass*

**Table 11. Education Requirements for Maker Technology Occupations in Bay Region**

Note: 55% of records have been excluded because they do not include a degree level. As a result, the chart below may not be representative of the full sample.

|  |  |  |
| --- | --- | --- |
| **Education (minimum advertised)** | **Latest 12 Mos. Postings** | **% of Total Indicating Ed. Level** |
| High school or vocational training | 3,290 | 79% |
| Associate Degree | 617 | 15% |
| Bachelor’s Degree or Higher | 278 | 7% |

*Source: Burning Glass*

# Methodology

Occupations for this report were identified by use of skills listed in O\*Net descriptions and job descriptions in Burning Glass. Labor demand data is sourced from Economic Modeling Specialists International (EMSI) occupation data and Burning Glass job postings data. Educational supply and student outcomes data is retrieved from multiple sources, including CTE Launchboard and CCCCO Data Mart.

# Sources

O\*Net Online

Labor Insight/Jobs (Burning Glass)

Economic Modeling Specialists International (EMSI)

CTE LaunchBoard [www.calpassplus.org/Launchboard/](http://www.calpassplus.org/Launchboard/)

Statewide CTE Outcomes Survey

Employment Development Department Unemployment Insurance Dataset

Living Insight Center for Community Economic Development

Chancellor’s Office MIS system

# Contacts

For more information, please contact:

* Karen Beltramo, Data Research Analyst, for Bay Area Community College Consortium (BACCC) and Centers of Excellence (CoE), karen@baccc.net or (831) 332-1253
* John Carrese, Director, San Francisco Bay Center of Excellence for Labor Market Research, jcarrese@ccsf.edu or (415) 452-5529