Instructional Program Review – Annual Update
2021

Date:	7/14/2021
Program and Department:	Machine & Manufacturing Technology
CTE Program?	☒ Yes ☐ No
Additional programs included in this review:	
Date of last comprehensive review:	2015
Submitted By:	John Gerrity
Attachments (* as needed):	☐ 6-year assessment plan – All programs, when applicable ☐ 2-year scheduling plan ☒ Justification for Resource Requests (if needed)

I.   Alignment of the Program with the AHC Mission

AHC Mission: Allan Hancock College fosters an educational culture that values equity and diversity and engages students in an inclusive learning environment. We offer pathways that encourage our student population to achieve personal, academic, and career goals through coursework leading to associate degrees, certificates, transfer, and skills building.

a.   Have there been any changes that would require a change to your Program Mission?

No

b. Explain how your program mission aligns with the college mission.

The college mission and values can be found here: https://www.hancockcollege.edu/about/mission.php

The Machining and Manufacturing Technology program provides students an opportunity to develop the skills required for success in manufacturing operations. The manufacturing sector requires a wide range of technical and creative skills. This program teaches technical skills such as CAD, CAM and creative/problem solving skills through various manufacturing projects that are designed to emulate the challenges faced by technicians in the workforce. The program also endeavors to provide retraining and skills enhancement to the local community by providing training on the latest advancements in manufacturing technology. This contributes to the economic vibrancy of the community as it enables companies to remain local and be competitive in the global market.

- The machine & manufacturing technology program will prepare students emotionally, physically, and intellectually to pursue fulfilling careers that foster economic mobility.
- The machine & manufacturing technology program will partners with the community to offer relevant and timely programs and services.
- The machine & manufacturing technology program will ensure a positive community presence by responding to community needs, including outreach to nontraditional students.
- The machine & manufacturing technology program strives to ensure fiscal integrity and responsible management of resources.

II.   Student Success, Program Accessibility and Program Capacity

*NO data analysis required this year.

a. Describe how the program works to promote student success (completions job placement, transfer). Include teaching innovations and use of academic and student support.

1. The machine & manufacturing technology program actively engages with local employers to connect students with job opportunities.
2. The machine & manufacturing technology program uses hybrid teaching to allow students to continue degree progression during COVID19
3. Ongoing collaboration with SMJUHSD to build MT pathways to AHC.

b. List any notable accomplishments of the program (student awards, honors, or scholarships can be listed here also)

- Gene Haas Scholarship donation $25,000
- Student Manufacturing Club formation

III.   Quality and Innovation in the Program and Curriculum Review

a. Are you on track in your assessment plan for course and program SLOs? If not, please explain why.

In progress/concurrent with curriculum updates

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b. Have you shared your assessments or improvement plans with your department, program or advisory committee? If so, what actions resulted? If not, how do you plan to do so in the future?

Program improvements have been discussed with the industrial advisory committee and the IT department. An emphasis on fundamental technical competence in material removal processes was voiced. An urgency for training using the latest technology given the limited training time available was also raised by members of the advisory board. The deficiency of math and hands-on skills of students entering the program was also discussed.

As a result of these recommendations the reorganization of discipline specific topics into three primary certificates has begun. This improves student understanding of the field, leads students to form achievable goals in manageable timeframes and unit counts.

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c. Did any of section, course or program improvement plans indicate that your program would benefit from specific resources in order to support student learning and/or faculty development? If so, please explain.

Need for lab maintenance support has been identified as the required maintenance schedule for capital equipment is greater than 500hrs per year in addition to the time required for inventory of lab supplies and consumables.

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d. In reviewing your outcomes and assessments have you identified any and all that indicate a modification should be made to the course outline, the student learning outcomes or the program outcomes? Please state what modifications you will be making.

In progress/concurrent with curriculum updates

The program improvement plan consists of 3 distinct areas with associated timelines:

1. Core Machining & Manufacturing (Improvements needed)
   Current Classes:
   a. MT 109 Intro (Survey of Machining & Manufacturing)
   b. MT 110 Intermediate (CNC G-Code)
   c. MT 111 Advanced (CNC – CAD/CAM)
   d. MT 112 Capstone (Multi-Axis)
2. Metrology & Inspection (QA, QC) Cert (Improvements + New Development)
   Current Classes:
   a. MT 117 Print Reading & Interpretation
   b. MT 118 GD&T
   c. (New) Statistical Process Control (SPC) IAB input/research
   d. (New) Quality Systems (ISO-9000/Quality Regulations) IAB input/research
3. Automation Production Cert (Improvements + New Development)
   a. MT 115 Lean Manufacturing
   b. (New) Introduction to Automation Controls (PLCs & Components)
   c. (New) Introduction to Computer Vision Systems
   d. (New) Integration of Robotics & Process Reliability

Primary focus has been bringing the MT CORE classes up to industry standard

Secondary focus based on IAB recommendation is the development of the metrology and inspection cert.

Automation & Production development is on hold pending implementation of QA/QC cert

e. Have all course outlines been reviewed within the last 5 years? If not, please explain the plan to bring course outlines up to date and include timelines for the review and submission to AP&P.

No. The plan for curriculum development has been broken into three categories along the lines of the proposed certificates/sub-fields in machine & manufacturing technology. (1 Core machining classes, 2 Metrology & Inspection, 3 Automation & Production) The industrial advisory board indicated the need for metrology and inspection and therefore it has been prioritized. Depending on AP&P approval lead times this process is projected to take 2-6yrs.

f. For **CTE courses/programs only**, as per §55003, have prerequisites, corequisites and advisories (PCAs) for courses and/or programs been reviewed within the last 2 years?

Course review in process

IV.   Focus and Engagement of the Program

a. Summarize major trends and opportunities as well as challenges that have emerged in the program

- Enrollment in the introductory class is currently dominated by non-majors. While this provides exposure and potential cross discipline participation it has been necessary to offer three sections in order to accommodate the number of students wishing to enroll. Departure of these initial student from the program back to their original majors contributes to lower enrollment than expected in subsequent/upper level program classes.
- Collaboration with the new high school CTE center has the potential to increase awareness of the MT program and boost enrollment

b. List any (internal or external) conditions that have influenced the program in the past year.

- EXTERNAL: COVID
- INTERNAL: Electrical service project delays and deadline overruns occurring Summer 2020 caused major disruption to the Fall 2020 classes. Students had to be rescheduled to alternate lab periods, an additional 3 periods were formed two weeks prior to class commencing.

Data for Program with Vocational TOP Codes (CTE): Please review the data and comment on any trends.

c. Current industry employment and wage data (please cite sources). Industry employment and wage trends:

Current employment trends are positive for program graduates with an 8% and 12% growth in the job market in SB and SLO counties respectively [1]. There were 496 related job postings from Jan 2021- Jun 2021 [2]. In general, the mean hourly wage is below the regional overall average ($27.07) for Santa Maria, $21.08 & $24.87 for machine operators and general "machinists" respectively. However program graduates who have gained advanced skills in metrology and machine programing enjoy a wage advantage of $34.40 and $37.54 on average.

Occupation code	Occupation title (click on the occupation title to view its profile)	Employment	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
17-3098	Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	180	$32.83	$34.40	$71,560	4.00%
51-4041	Machinists	500	$22.98	$24.87	$51,730	4.30%
51-9161	Computer Numerically Controlled Tool Operators	320	$19.28	$21.08	$43,840	7.10%
51-9162	Computer Numerically Controlled Tool Programmers	60	$36.92	$37.53	$78,070	4.30%

Source: https://www.bls.gov/oes/current/oes_42200.htm

[1] https://www.bls.gov/regions/west/news-release/occupationalemploymentandwages_santabarbara.htm

[2] Attached Emsi report

d. TOP code employment CORE indicator report

PERKINS IV Core Indicators of Performance by 6-digit Vocational TOP Code

Summary Detail Report for 2020-2021 Fiscal Year Planning

ALLAN HANCOCK COLLEGE

095630 Machining and Machine Tools

	Core 1 Skill Attainment			Core 2 Completions			Core 3 Persistence		
	Percent	Count	Total	Percent	Count	Total	Percent	Count	Total
Program Area Total	93.33	14	15	85.71	6	7	85.71	12	14
Female	100.00	1	1		0	0	100.00	1	1
Male	92.86	13	14	85.71	6	7	84.62	11	13
Non-traditional	100.00	1	1		0	0	100.00	1	1
Displaced Homemaker		0	0		0	0		0	0
Economically Disadvantaged	92.86	13	14	83.33	5	6	84.62	11	13
Limited English Proficiency	100.00	1	1		0	0	100.00	1	1
Single Parent		0	0		0	0		0	0
Students with Disabilities		0	0		0	0		0	0
Technical Preparation		0	0		0	0		0	0
District	93.33	14	15	85.71	6	7	85.71	12	14
State	93.38	8,521	9,125	84.51	3,454	4,087	80.95	7,158	8,843

	Core 4 Employment			Core 5a NT Participation			Core 5b NT Completion		
	Percent	Count	Total	Percent	Count	Total	Percent	Count	Total
Program Area Total	83.33	5	6	6.67	1	15	0.00	0	6
Female		0	0	100.00	1	1		0	0
Male	83.33	5	6	0.00	0	14	0.00	0	6
Non-traditional		0	0	6.67	1	15	0.00	0	6
Displaced Homemaker		0	0		0	0		0	0
Economically Disadvantaged	83.33	5	6	7.14	1	14	0.00	0	5
Limited English Proficiency		0	0	0.00	0	1		0	0
Single Parent		0	0		0	0		0	0
Students with Disabilities		0	0		0	0		0	0
Technical Preparation		0	0		0	0		0	0
District	83.33	5	6	6.67	1	15	0.00	0	6
State	85.47	3,218	3,765	4.07	487	11,980	3.02	143	4,734

The DR notation indicates privacy requirements - EDD requires that counts less than six not be displayed.

Performance Rate Less Than Goal is Shaded

Core 1 - Skill Attainment, GPA 2.0 & Above: 88.42% Performance Goal - (2017- 2018)
Core 2 - Completions, Certificates, Degrees and Transfer Ready: 89.00% Performance Goal - (2017- 2018)
Core 3 - Persistance in Higher Education: 91.00% Performance Goal - (2017- 2018)
Core 4 - Employment: 73.23% Performance Goal - (2017- 2018)
Core 5 - Training Leading to Non-traditional Employment: Greater than 19.93% Participation & 23.97% Completion - (2017- 2018)

Source: CCCCO MIS Database, EDD Base Wage File, CSU Chancellor's Offce,
UC Office of the President, 2000 Census, Student Loan Clearing House

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e. Advisory committee recommendations

At the last advisory committee, a discussion led to the consensus that the most pressing need of local industry was for QA/QC training and qualified personnel in this sub-field of manufacturing. Consequently, the focus will be development of the Metrology & Inspection curriculum/certificate. These classes are:

1. MT117 Print reading and Interpretation (Under review Spring 2022)
2. MT118 Understanding and Measuring GD&T (Under review)
3. MT119 Automated Inspection and Data Analysis (New class proposal)
4. MT120 Quality Systems and Process Controls (New class proposal)

V.   Continuous Improvement of the Program

a. Status of Final Plan of Action – Post Validation
    Summarize the progress made on the recommendations from your last comprehensive program
    review plan of action

PLAN OF ACTION	ACTION TAKEN/RESULT AND STATUS
Comprehensive review scheduled for next year	

b. List any new resources that the program received in the past year and the results

Source	Specific Resource	Est. Amount $	Impact on program or course outcomes
SWP	CAD Laptops (40)	$60k	Greatly improves the ability of students to participate remotely as the CAD software used in manufacturing is computationally intensive and usually beyond the capabilities of a student owned computer.
SWP	NCSimul (Software)	$10k	Machine simulation software – aids students' ability to verify machine code remotely, helps prevent injury and equipment damage due to incorrect programing
SWP	PolyWorks	$14k	Allows for use of inspection data analysis by 20 students
SWP	O216 Facility Improvements	$86k	Allow for increased student capacity during COVID, corrected deficient electrical and pneumatic systems in lab
SWP	Toolboxes & Tool Organization	$15k	Increase teaching efficiency, protect valuable tools, security
SWP	MQL Systems (25)	$15k	Decrease environmental impact of program, reduce hazardous material generation by and estimated 200gal per yr. Reduce potential student exposure to infection via contaminated cutting fluid
Restricted Lottery	Solidworks Lic	$2.4k	Maintain ability for students to use CAD MT113 & MT114
SWP	Solidworks Lic Upgrade	$2.140k	Allow for off campus access of remote students to CAD software
SWP	CAT40 Tooling Cart	$750	Tooling organization

c. List any new or modified recommendations below, including rationale for these in the table.

Contents of this table are included in the following table. The previous comprehensive program update listed the general goals of maintaining currency with industry standards and the need to replace worn/broken equipment. The resource requests listed in section (d.) align with those goals.

Program Improvement Plan (Program ,Priority Number, year)	Anticipated Outcome (Goal)	Program Goal Status (Indicate if this goal is ongoing from a previous Annual Or Comprehensive Program Review or new this year).	Alignment to Strategic Directions and planning goals (see " Alignment to Strategic Directions" Attached	Activities	Justification (Evidence of need)	Resource Request (From table Below)	Anticipated Completion Date or On-going
See following table							

d. Summary of request for resources. Please list the type of request (facility, technology, staffing, equipment, other) and rank their priority.
    See Attached Excel sheet. Capital equipment and resource requests are broken down by maintenance and replacement of existing equipment and new requests required to maintain currency with industry standards.

MT program broken into three sub categories:

1. MT CORE – Machining
2. MT QA/QC cert – Metrology and Inspection
3. MT A&P cert – Automation and Production

Priorities:

0. Requested last year - Implement with approved funding this year
1. Request funding – Implement 2021-2022
2. Request funding – Implement 2022-2021
3. Research In progress

Resource Requests (Program, RRX year)	Item	Program Goal	Type	One-time cost	On-going cost (per fiscal year)	Anticipated Completion Date or On-going
MT CORE MT QA/QC MT A&P 2021 Priority 1	20 CSEA Classified Technical Range	Maintain a safe manufacturing environment for students, ensure lab equipment in operational condition, assist with setup and tear down of labs	Staffing		$3471/mo x 19.5/37 x 10 months = est. $18,293 + benefits	On going
MT CORE 2021 Priority 2	DRO Lathe Kit	Allows earlier introduction of work coordinates and tool offsets in the curriculum (MT109), better prepares students to understand concepts in MT110	Equipment	($1800 x 5 units + s&h + Tax) Est = $10K		December 2021

MT CORE MT A&P 2021 Priority 1	Bandsaw Replacement	Surplus and consolidate from two separate units that are maintenance intensive and failure prone. Increases space in lab for teaching equipment	Equipment	$15k + s&h + tax		September 2021
MT CORE MT QA/QC 2021 Priority 2	Granite Plate, 24"x36"x4", Inspection Grade A	Replace worn surface plate - Current inspection plates are worn and inaccurate, >10yrs expired calibration	Equipment	$3K + s&h +tax		September 2021
MT CORE MT QA/QC 2021 Priority 2	Inspection Gage Block Set	Primary reference inspection and measurement standard, used in both metrology and core machining classes - current sets missing components and worn	Equipment	$4K		September 2021
MT CORE MT QA/QC 2021 Priority 2	Renishaw QC20-W	Used to calibrate CNC machines, allows for students in metrology & core machining classes to access equipment accuracy and perform root cause analysis	Equipment	$12K Requested		September 2021
MT CORE 2021 Priority 1	Downdraft dust collector bench	Protect students from inhaling abrasive dust, prevent abrasive dust from contaminating sensitive equipment	Equipment	~$11k Requested ($1500 per, qty 6) + s&h +tax		September 2021
MT CORE MT QA/QC 2020 Priority 0	CMM – Coordinate Measurement Machine	Required for teaching Metrology/GD&T QA/QC Cert	Equipment	$70,000		Spring 2021

MT CORE MT A&P 2020 Priority 0	Pocket NC V2-50	5 Axis CNC Training Tool, portable for outreach to schools, can be taken to competition	Equipment	$9000 per x2 =$18,000 + s&h + tax		Summer 2021

MT CORE 2021 Priority 1&2	Manual Knee Mill Replacement	Replace worn manual equipment - dual usage for both manual and CNC classes, doubles the capacity for CNC classes	Equipment	$31,500 per x5 = $157,500		Fall 2021- Fall 2022
MT CORE 2021 Priority 1&2	Manual Lathe Replacement	Replace worn manual equipment	Equipment	$23k per x5 = $115,000		Fall 2021- Fall 2022
MT CORE MT QA/QC MT A&P 2021 Priority 1	Projectors and Screens (O216)	Teaching lab setups	Technology	~$20000		Fall 2021
MT CORE, MT QA/QC MT A&P 2021 Priority 3	Fume Hoods O112	Teaching advanced mfg processes, SLS 3D printing and coating processes	Facilities	TBD - researching		Spring 2023
MT CORE MT A&P 2020 Priority 0	6" Single Station Vise	Work holding required for manual and CNC mill training	Equipment	$1649.95 x4 = $6599.8 + S&h + tax		Fall 2021
MT CORE MT QA/QC 2022 Priority 2	SJ-210 Portable Roughness Tester, 4mN	Used to train students in surface quality inspection	Equipment	$3k		Fall 2022
MT CORE MT QA/QC 2022 Priority 2	Optical Comparator Replacement	Used in both metrology and core machining classes to optically check component and tooling dimensions	Equipment	$15k		Fall 2022

MT CORE MT QA/QC 2022 Priority 2	Inspection Height Gage	Used in both metrology and core machining classes - current gage is missing components and worn	Equipment	$3k		Fall 2022
MT CORE MT A&P 2020 Priority 3	CNC Fiber Laser – Sheet metal processing	Combined use with Welding Program, advanced manufacturing system adds new training of students in both programs	Equipment	$130k		Spring 2023
MT CORE MT A&P 2020 Priority 3	Multi Axis CNC Machine	Seeking recommendations from IAB - advanced manufacturing system used in core machining classes (MT111 & MT112)	Equipment	$250-550k		Spring 2023
MT CORE MT A&P 2020 Priority 3	Injection Molding Machine	Used for advanced manufacturing and production training	Equipment	$120k		Spring 2023
MT CORE MT A&P 2020 Priority 3	Sinker EDM (Electron Discharge Machining)	Used for advanced manufacturing and production training	Equipment	TBD - researching		Spring 2023
MT CORE MT A&P 2020 Priority 3	Wire EDM (Electron Discharge Machining)	Used for advanced manufacturing and production training	Equipment	TBD - researching		Spring 2023

Machine Type	Manufacturer	Model	AHC Property #	Serial	Mfg Date	Function	Notes	Priority	Action
CNC Mill	Haas	TM 1P		1059587	7/1/2007	Functional	Functional, Intermitant Conrol Error	3	
CNC Mill	Haas	TM 2		1107220	9/1/2013	Poor Function	Poor Functioning	2	Replace next year with 5-axis capable machine - seeking recommendations from IAB, $270-550k
CNC Mill	Haas	TM 1		1107222	9/1/2013	Poor Function	Poor Functioning, rust damage in Y-axis ballscrew	0	Replace this year with $148k allocation
CNC Mill	Haas	TM 1P		1135371	12/1/2016	Functional	Funtional	0	
CNC Lathe	Haas	ST 10Y		3096981	9/1/2013	Functional	Functional, missing tooling	1	Add Axial($1.6k), Radial live tool holder($2.6), bar puller($500), left hand holder ($300)
CNC Lathe	Haas	TL 1		3113388	1/1/2019	Functional	Functional, intermitant tool change jam due to moisture in air line damage	0	
CNC Lathe	Haas	TL 1		3113387	1/1/2019	Functional	Functional, intermitant tool change jam due to moisture in air line damage	0	
Manual Mill	Bridgeport	2J	706320	151946		Poor Function	Poor Functioning - worn spindle bearings	1	Surplus and replace with KENTUSA or Bridgeport or TRAK CNC Kneemill ($27-32k)
Manual Mill	Sharp	LMV-50	716774	71030630	1/1/2009	Poor Function	Poor Functioning - worn spindle, transmission CVT worn, table gibs worn	2	
Manual Mill	Sharp	LMV-50	716773	71030628	1/1/2009	Poor Function	Poor Functioning - worn spindle, transmission CVT worn, X-axis screw warp	2	
Manual Mill	Sharp	TMV-2	716775	50101765	1/1/2019	Functional	Functional, Transmission CVT worn	0	
Manual Lathe	Emco	Maximat V13		D2P870200	1/1/2002	Functional	Functional, No Safety guards or spindle brake	2	Replace with equivalent high precision lathe
Manual Lathe	Ganesh	GT 1340	723027	I10303-039	1/1/2015	Poor Function	Poor function	1	Replace (19-23k) 2021
Manual Lathe	Ganesh	GT 1340	723028	I10303-039	1/1/2015	Poor Function	Poor function	1	Replace (19-23k) 2021
Manual Lathe	Ganesh	GT 1340		I10205-003	1/1/2015	Poor Function	Poor function	1	Replace (19-23k) 2022
Manual Lathe	Ganesh	GT 1340		I10201-001	1/1/2015	Poor Function	Poor function	1	Replace (19-23k) 2022
Horizontal Bandsaw	Ganesh	S-1014VS		10055805	5/1/2010	Poor Function		1	Surplus - do not replace
Vertical Bandsaw	Grizzly	G8146Z	10201002		4/1/2018	Functional	Not appropriate for metal working - wood working saw	1	Surplus and replace with Rollin Saw (14k - Perkins)
Surface Grinder	Brown & Sharpe	No. 5		1503		Inoperable	Inoperable - Surplus	1	Surplus
Surface Grinder	Kent USA	KGS 618	712258	KI50917	12/1/2005	Functional	Functional	1	Add Dust enclosure ($500)
Bench Grinder 6"	Delta					Functional	Needs dust collection	1	Downdraft table ($1.5K)
Bench Grinder 6"	Baldor					Functional		1	Downdraft table ($1.5K)
Bench Grinder 6"	Baldor					Functional		1	Downdraft table ($1.5K)
Bench Grinder 6"	Baldor					Functional		1	Downdraft table ($1.5K)
Tooling Grinder 6"	Baldor					Functional		1	Downdraft table ($1.5K)
Derex Drill Grinder	Derex					Functional		1	Downdraft table ($1.5K)
6in Belt & Disk Sander						Poor Function	Surplus, bent shaft & worn bearings	1	Surplus and replace with BurKing or equivalent (~$1.8k)
2in Belt Sander						Inoperable	Bent frame, worn bearings	1	Surplus and replace with BurKing or equivalent (~$1.8k)
Drill Press						Poor Function	Worn quill sleeve, bearings	2	Surplus and replace (~$10k) also replaces PowerMatic dual drill press unit surplused last year
FARO Inspection arm						Functional	Missing scanning head, Can't pass calibration, Mfg refit requires shipping to FL + cost, recommend trade in for current tech	3	Research trade in & upgrade options estimate ($20k)
CNC Mill	Haas	VF2				Poor Function	Spindle bearings worn, svc tech from Haas recommends spindle cartrige replacement	1	Repair estimate (~10k)
CNC lathe	Haas	SL10				Functional		0	
FDM 3D Printer	MakerBot					Inoperable	Surplus and replace	2	$5k
FDM 3D Printer	MakerBot					Inoperable	Suplus and replace	2	$5k
Laser Engraver	Universal Laser					Functional	Need proper fume exhust out of CAD lab to use	2	Need to get estimates for fume hood & exhuast - Facilities
Laser Engraver	Universal Laser					Functional	Need proper fume exhust out of CAD lab to use	2	Need to get estimates for fume hood & exhuast - Facilities

Machine Type	Notes	Priority	Action	Justification	Link	Link	Link
CMM	70k Allocated 2021	0	Purchase and Install	Required for QA/QC cert			
Pocket NC	18k Allocated 2021	0	Purchase and Install	MT111 & MT112, Portable for outreach demo			
Lista Cabinets	12k Allocated 2021	0	Purchase and Install	Organization/Teaching efficiency/security			
Vises	16k Allocated 2021	0	Purchase and Install	Increase # of students per machine			
DRO Lathe Kit	$10k Requested, Perkins/SWP 2021-2022	2	Request Budget	Allows earlier introduction of work coordinates and tool offsets in the curriculum (MT109), better prepares students to understand concepts in MT110			
Bandsaw Replacement	$10k Requested, Perkins/SWP 2021-2022	1	Request Budget	Allows for surplus of both vertical and horizontal bandsaws, reduces footprint in lab, replaces worn failure prone equipment			
Granite Plate, 24"x36"x6", Inspection Grade A	$6K	2	Request Budget	Current inspection plates are worn and inaccurate, >30yrs expired calibration			
Renishaw QC20-W	$13K Requested	1	Request Budget	Used to calibrate CNC machines, allows for students in metrology & core machining classes to assess equipment accuracy and perform root cause analysis	https://www.grainger.com/product/BUFFALO-ABRASIVES-Downdraft-Table-4VJ61N		
Downdraft dust collection bench	$10k Requested ($1000/per, qty 4)	1	Request Budget	Protect students from inhaling abrasive dust, prevent abrasive dust from contaminating sensitive equipment			
SJ-210 Portable Roughness Tester, 6mM	$9k Requested	2	Request Budget	Used in metrology to quantify surface finish of machined components			
Optical Comparator Replacement	$15k Requested	2	Request Budget	Used in both metrology and core machining classes to optically check component and tooling dimensions			
Gage Block Set	$6K Requested	2	Request Budget	Primary reference inspection and measurement standard, used in both metrology and core machining classes - current sets missing components and worn			
Inspection Height Gage	$6k Requested	2	Request Budget	Used in both metrology and core machining classes - current gage is missing components and worn	https://bescutter.com/collections/fiber-laser-cutting-machines/products/bescutter-cube-series-3kw-4kw-fiber-laser-metal-sheet-cutter?variant=37670387212	https://www.bgblaster.com/laser-cutting-machines	https://boxxlaser.com/cnc/fiber-lasers/openhttps-fiber-laser-cnc/
CNC Fiber Laser Cutting	$100k	2	Request Budget	Combined use with Welding Program, advanced manufacturing system adds new training of students in both programs			
CNC Sheet Router	$100K	2	Request Budget	Joint use in collaboration with Tech Theater - Allows for training for cabinet/wood mfg./aerospace (SoF/sm) adds new training of students in both programs			
Multi Axis CNC Machine	$250-500k	2	Consulting VIA	Seeking recommendations from VIA - advanced manufacturing system used in core machining classes (MT111 & MT112)			
Injection Molding Machine	$120k	3	Research	Consult local industry on training need, develop requirements			
Sinker EDM	$90k	3	Research	Consult local industry on training need, develop requirements			
Wire EDM	$100k	3	Research	Consult local industry on training need, develop requirements			
Stamping Machine	$50k	3	Research	Consult local industry on training need, develop requirements			
Fume hoods D122	TBD	3	Research	Consult/estimates from contractors			

8 Occupations
in 2 California Counties

Contents

What is Emsi Data?

Emsi data is a hybrid dataset derived from official government sources such as the US Census Bureau, Bureau of Economic Analysis, and Bureau of Labor Statistics. Leveraging the unique strengths of each source, our data modeling team creates an authoritative dataset that captures more than 99% of all workers in the United States. This core offering is then enriched with data from online social profiles, resumés, and job postings to give you a complete view of the workforce.

Emsi data is frequently cited in major publications such as *The Atlantic*, *Forbes*, *Harvard Business Review*, *The New York Times*, *The Wall Street Journal*, and *USA Today*.

Report Parameters

8 Occupations

51-4041	Machinists
51-9161	Computer Numerically Controlled Tool Operators
51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic
51-4034	Lathe and Turning Machine Tool Setters,

17-3026	Industrial Engineering Technologists and Technicians
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers
17-3098	Calibration Technologists and Technicians and Engineering Technologists and Technicians, Exc

2 Counties

6079	San Luis Obispo County, CA

6083	Santa Barbara County, CA

Class of Worker

QCEW Employees, Non-QCEW Employees, and Self-Employed

The information in this report pertains to the chosen occupations and geographical areas.

Executive Summary

Average Job Posting Demand Over a Thin Supply of Regional Jobs
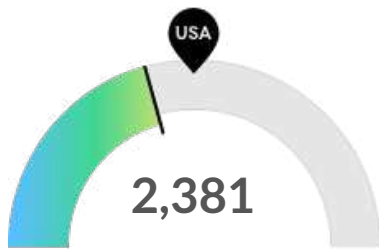
2,381

Jobs (2021)

Your area is not a hotspot for this kind of job. The national average for an area this size is 3,086* employees, while there are 2,381 here.
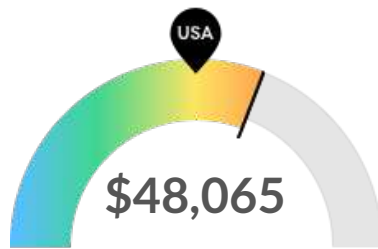
$48,065

Compensation

Earnings are high in your area. The national median salary for your occupations is $44,509, compared to $48,065 here.

83
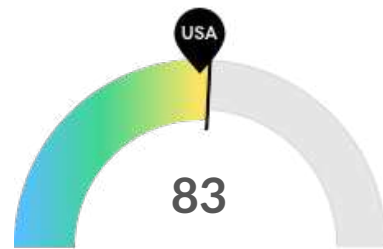
Job Posting Demand

Job posting activity is about average in your area. The national average for an area this size is 79* job postings/mo, while there are 83 here.

*National average values are derived by taking the national value for your occupations and scaling it down to account for the difference in overall workforce size between the nation and your area. In other words, the values represent the national average adjusted for region size.

Jobs

Regional Employment Is Lower Than the National Average

An average area of this size typically has 3,086* jobs, while there are 2,381 here. This lower than average supply of jobs may make it more difficult for workers in this field to find employment in your area.
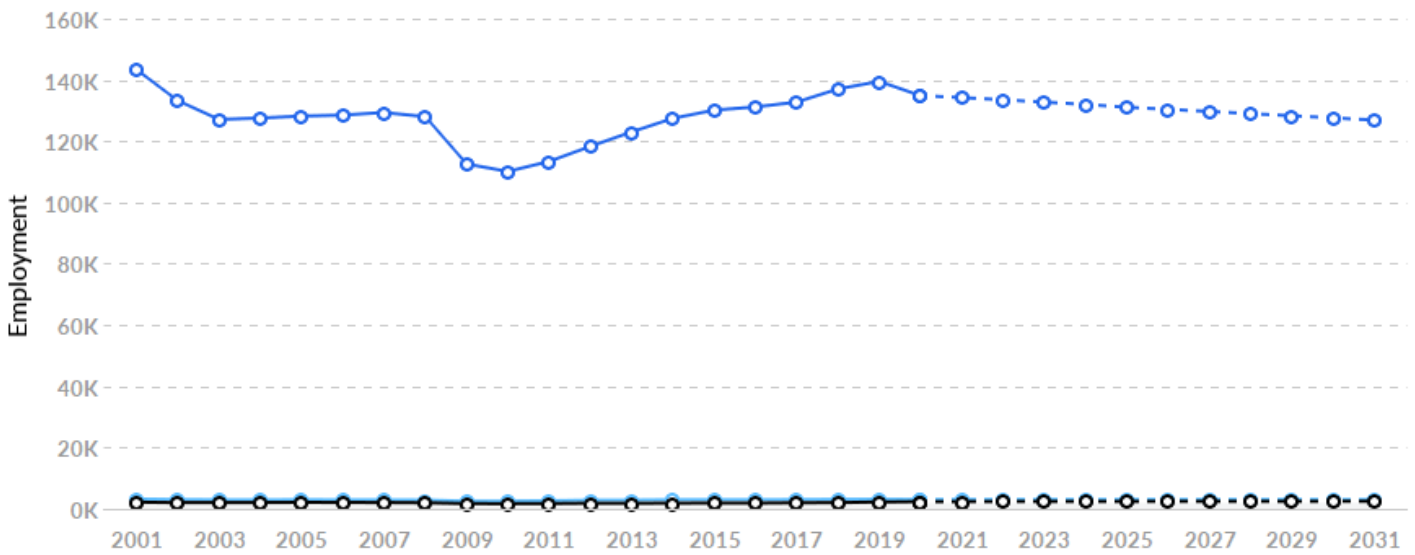
	Region	2021 Jobs	2026 Jobs	Change	% Change
●	2 California Counties	2,381	2,449	68	2.8%
●	National Average	3,086	3,088	1	0.0%
●	California	134,242	130,398	-3,844	-2.9%

*National average values are derived by taking the national value for your occupations and scaling it down to account for the difference in overall workforce size between the nation and your area. In other words, the values represent the national average adjusted for region size.

Regional Breakdown

County	2021 Jobs
Santa Barbara County, CA	1,796
San Luis Obispo County, CA	585

Most Jobs are Found in the Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing Industry Sector
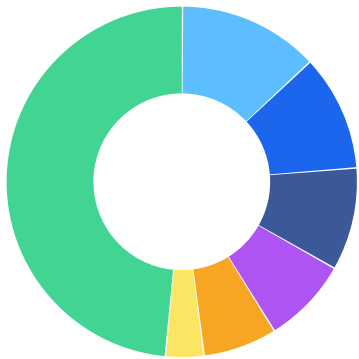
Industry	% of Occupation in Industry (2021)
● Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	13.0%
● Employment Services	10.7%
● Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	9.5%
● Aerospace Product and Parts Manufacturing	7.9%
● Architectural, Engineering, and Related Services	6.8%
● Industrial Machinery Manufacturing	3.5%
● Other	48.6%

Compensation

Regional Compensation Is 8% Higher Than National Compensation

For your occupations, the 2020 median wage in your area is $23.11/hr, while the national median wage is $21.40/hr.
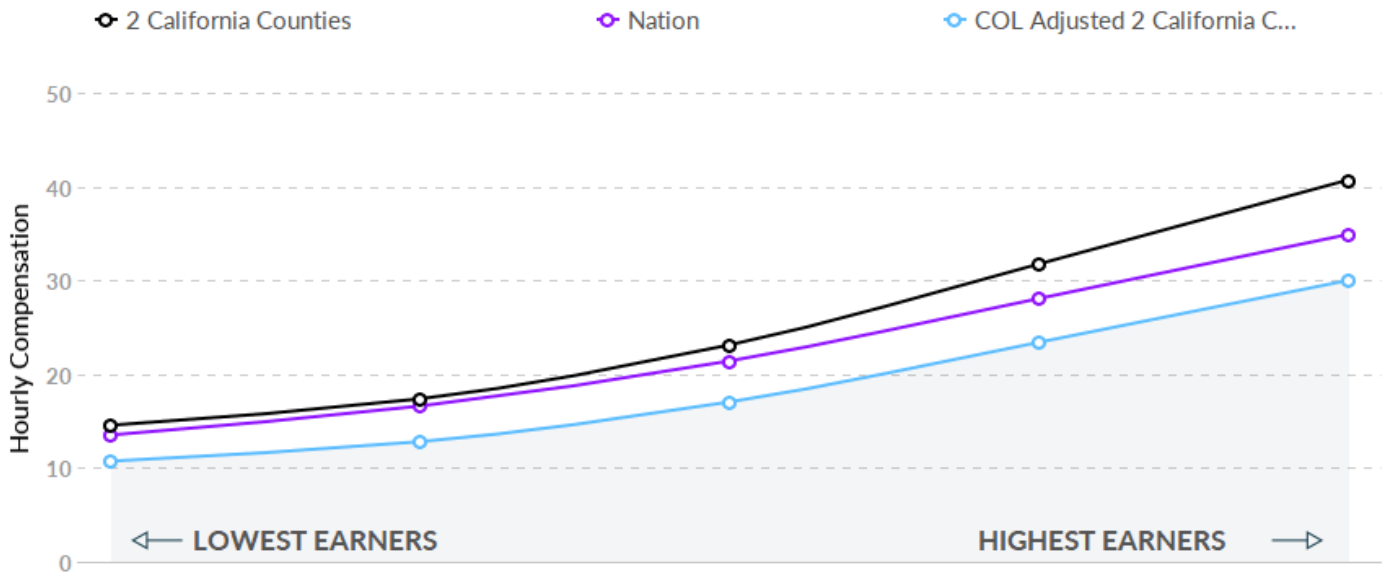
Job Posting Activity

496 Unique Job Postings

The number of unique postings for this job from Jan 2021 to Jun 2021.

137 Employers Competing

All employers in the region who posted for this job from Jan 2021 to Jun 2021.

18 Day Median Duration

Posting duration is 3 days shorter than what's typical in the region.

● Monthly Unique Postings   ● Estimated Hires Per Month*
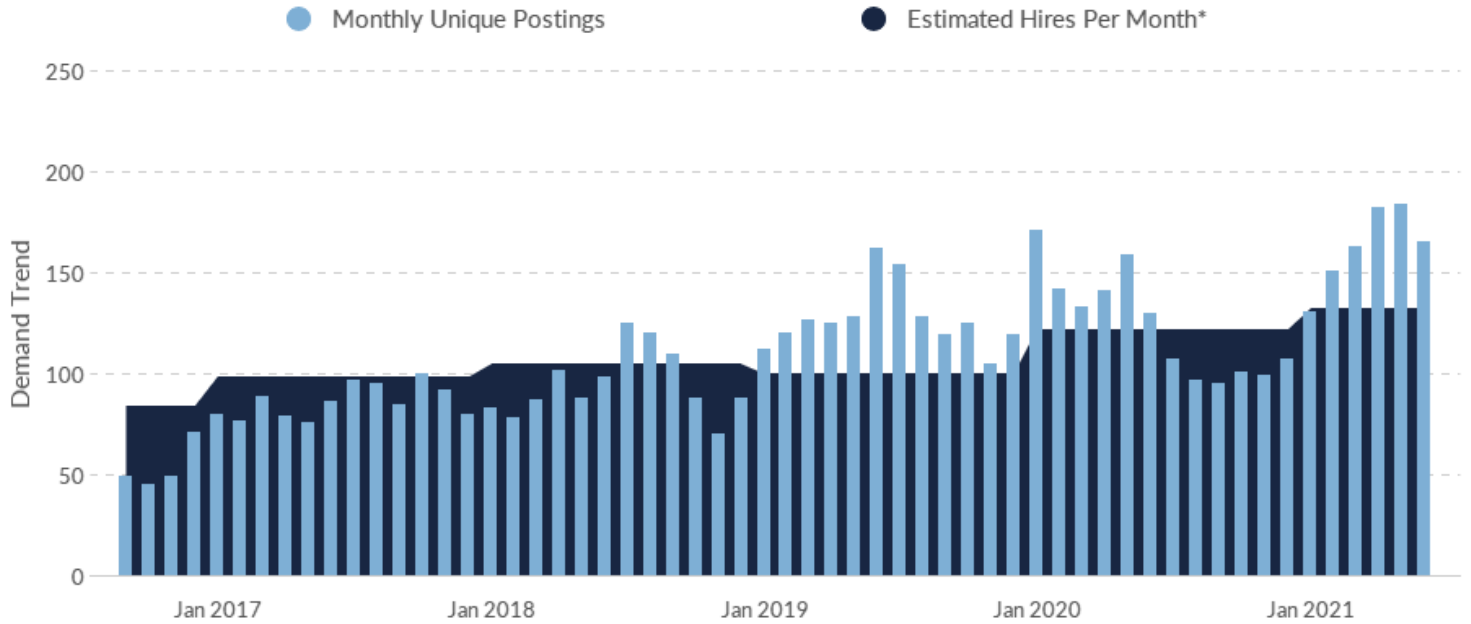
Occupation	Avg Monthly Postings (Jan 2021 - Jun 2021)	Avg Monthly Hires (Jan 2021 - Jun 2021)
Inspectors, Testers, Sorters, Samplers, and Weighers	64	60
Industrial Engineering Technologists and Technicians	40	3
Machinists	36	38
Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	10	11
Computer Numerically Controlled Tool Operators	12	15
Computer Numerically Controlled Tool Programmers	1	3
Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0	1
Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	0	0

*A hire is reported by the Quarterly Workforce Indicators when an individual's Social Security Number appears on a company's payroll and was not there the quarter before. Emsi hires are calculated using a combination of Emsi jobs data, information on separation rates from the Bureau of Labor Statistics (BLS), and industry-based hires data from the Census Bureau.

Top Companies	Unique Postings		Top Job Titles	Unique Postings
Volt Information Sciences Inc	35		Manufacturing Technicians	36
Entegris, Inc.	18		Quality Inspectors	36
United States Department of th…	13		Machinists	29
L3 Technologies	12		CNC Machinists	26
Select Staffing	10		Usage Testers/Product Testers	19
Space Exploration Technologies …	9		Air Quality Inspectors	17
Northrop Grumman Corporation	8		Manual Machinists	15
Continental AG	7		CNC Operators	12
Excel Personnel Inc	7		Quality Assurance Inspectors	12
L3Harris Technologies	7		Quality Control Technicians	11

Top Hard Skills

● Frequency in Job Postings   ● Frequency in Profiles
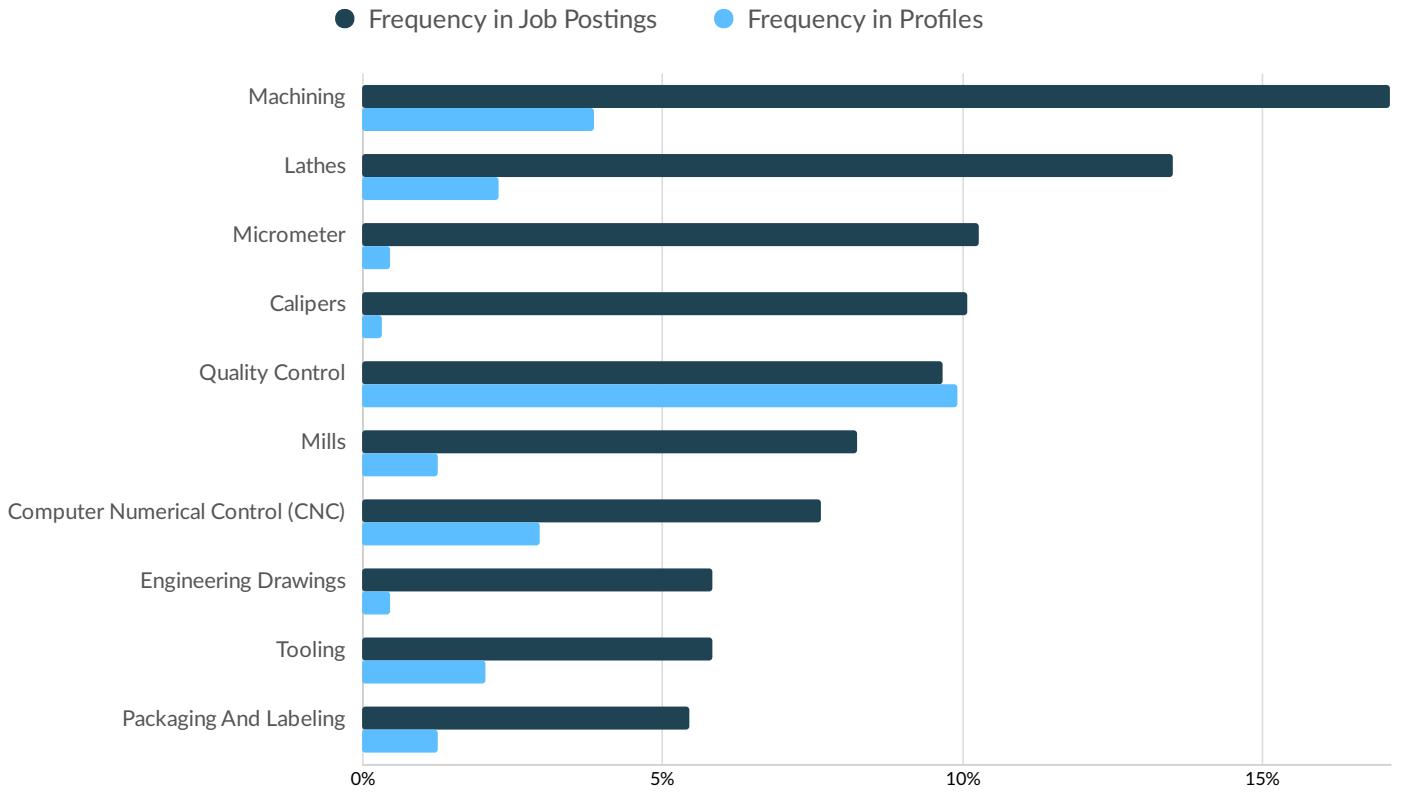
Skills	Postings	% of Total Postings	Profiles	% of Total Profiles
Machining	85	17%	34	4%
Lathes	67	14%	20	2%
Micrometer	51	10%	4	0%
Calipers	50	10%	3	0%
Quality Control	48	10%	87	10%
Mills	41	8%	11	1%
Computer Numerical Control (CNC)	38	8%	26	3%
Engineering Drawings	29	6%	4	0%
Tooling	29	6%	18	2%
Packaging And Labeling	27	5%	11	1%

Top Common Skills

● Frequency in Job Postings   ● Frequency in Profiles
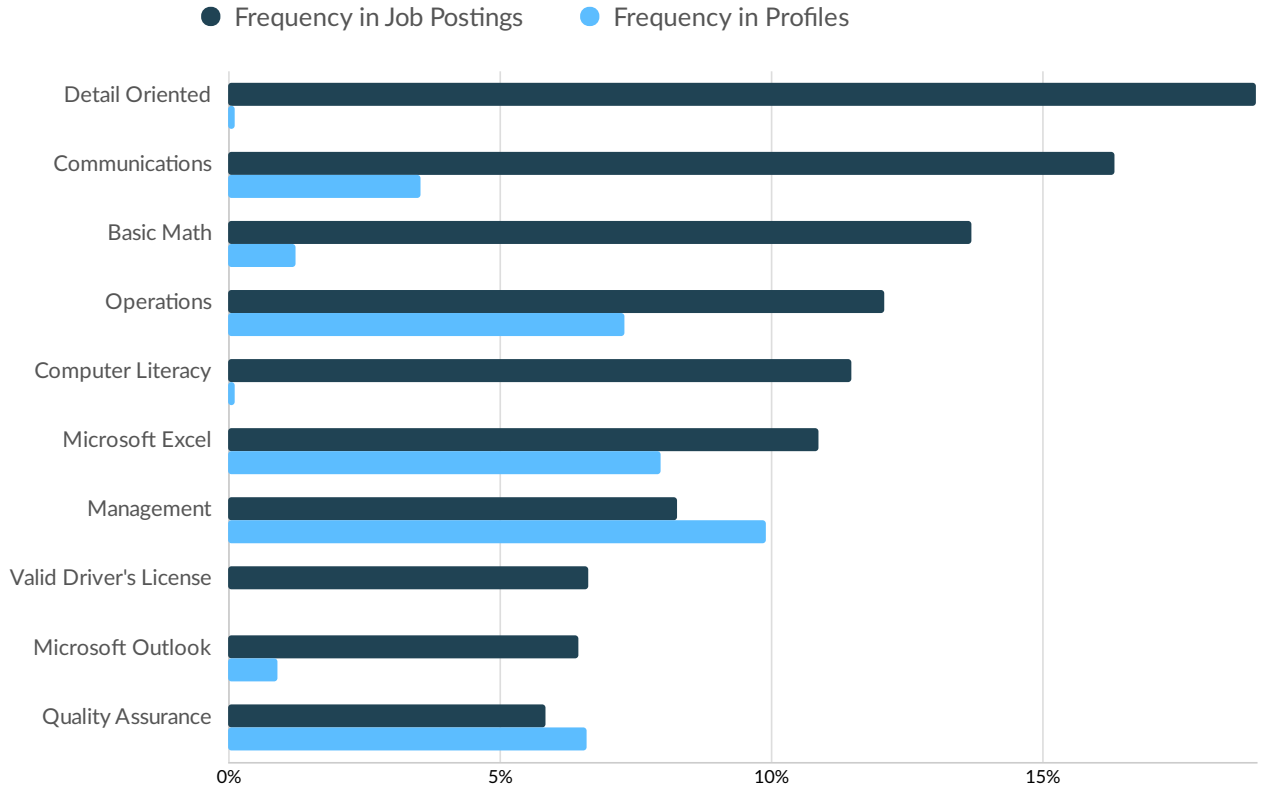
Skills	Postings	% of Total Postings	Profiles	% of Total Profiles
Detail Oriented	94	19%	1	0%
Communications	81	16%	31	4%
Basic Math	68	14%	11	1%
Operations	60	12%	64	7%
Computer Literacy	57	11%	1	0%
Microsoft Excel	54	11%	70	8%
Management	41	8%	87	10%
Valid Driver's License	33	7%	0	0%
Microsoft Outlook	32	6%	8	1%
Quality Assurance	29	6%	58	7%

Demographics

## Retirement Risk Is About Average, While Overall Diversity Is High

724
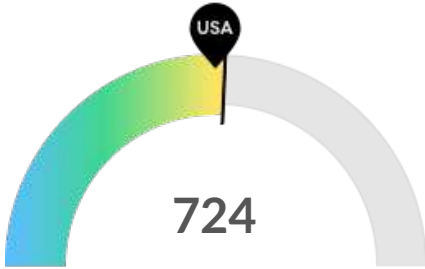
Retiring Soon

Retirement risk is about average in your area. The national average for an area this size is 693* employees 55 or older, while there are 724 here.
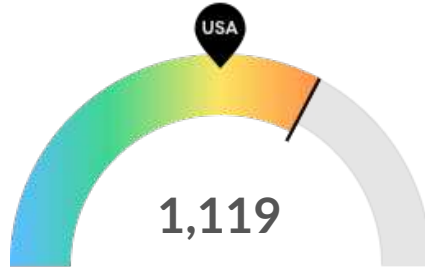
1,119

Racial Diversity

Racial diversity is high in your area. The national average for an area this size is 727* racially diverse employees, while there are 1,119 here.

477
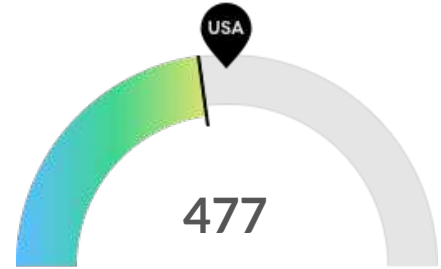
Gender Diversity

Gender diversity is low in your area. The national average for an area this size is 541* female employees, while there are 477 here.

*National average values are derived by taking the national value for your occupations and scaling it down to account for the difference in overall workforce size between the nation and your area. In other words, the values represent the national average adjusted for region size.

Occupation Age Breakdown
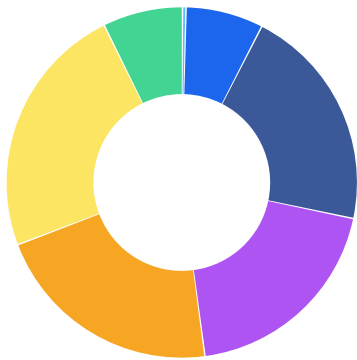
	% of Jobs	Jobs
14-18	0.3%	8
19-24	7.1%	168
25-34	20.8%	487
35-44	19.6%	459
45-54	21.3%	501
55-64	23.5%	551
65+	7.4%	173

Occupation Race/Ethnicity Breakdown
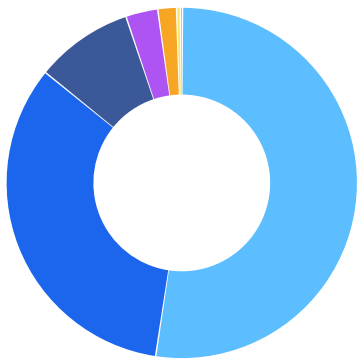
	% of Jobs	Jobs
● White	52.3%	1,227
● Hispanic or Latino	33.4%	785
● Asian	9.0%	211
● Black or African American	3.0%	69
● Two or More Races	1.7%	40
● American Indian or Alaska Native	0.3%	8
● Native Hawaiian or Other Pacific Islander	0.2%	5

Occupation Gender Breakdown
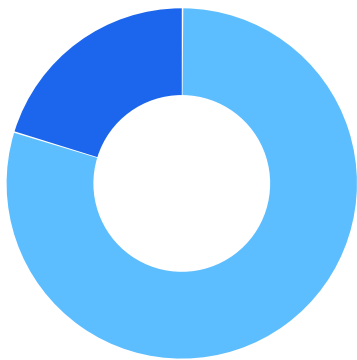
	% of Jobs	Jobs
● Males	79.7%	1,869
● Females	20.3%	477

Occupational Programs

7 Programs

Of the programs that can train for this job, 7 have produced completions in the last 5 years.

80 Completions (2019)

The completions from all regional institutions for all degree types.

380 Openings (2019)

The average number of openings for an occupation in the region is 69.

CIP Code	Top Programs	Completions (2019)	
15.0612	Industrial Technology/Technician	48	
15.1301	Drafting and Design Technology/Technician, General	18	
48.0501	Machine Tool Technology/Machinist	10	
15.0000	Engineering Technology, General	2	
15.1503	Packaging Science	2	

Top Schools	Completions (2019)	
California Polytechnic State University-San Luis Obispo	50	
Allan Hancock College	20	
Santa Barbara City College	10	

Appendix A - Data Sources and Calculations

Location Quotient

Location quotient (LQ) is a way of quantifying how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to the nation. It can reveal what makes a particular region unique in comparison to the national average.

Occupation Data

Emsi occupation employment data are based on final Emsi industry data and final Emsi staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level Emsi earnings by industry.

Staffing Patterns Data

The staffing pattern data in this report are compiled from several sources using a specialized process. For QCEW and Non-QCEW Employees classes of worker, sources include Occupational Employment Statistics, the National Industry-Occupation Employment Matrix, and the American Community Survey. For the Self-Employed and Extended Proprietors classes of worker, the primary source is the American Community Survey, with a small amount of information from Occupational Employment Statistics.

Cost of Living Data

Emsi's cost of living data is based on the Cost of Living Index published by the Council for Community and Economic Research (C2ER).

Emsi Job Postings

Job postings are collected from various sources and processed/enriched to provide information such as standardized company name, occupation, skills, and geography.

Institution Data

The institution data in this report is taken directly from the national IPEDS database published by the U.S. Department of Education's National Center for Education Statistics.