

LABOR MARKET ANALYSIS

FOR PROGRAM RECOMMENDATION



C·O·E

CENTERS OF EXCELLENCE
FOR LABOR MARKET RESEARCH

ADDITIVE MANUFACTURING IN THE FAR NORTH

Far North
Center of Excellence

SEPTEMBER 2023

TABLE OF CONTENTS

Summary.....	3
Introduction.....	4
Occupational Demand.....	5
Wages.....	7
Job Postings.....	7
About Job Postings Analysis.....	7
Occupations and Job Titles.....	8
Employers.....	9
Certifications, Skills, and Experience.....	9
Education and Training.....	12
Educational Supply.....	14
Community College Supply.....	14
Other Postsecondary Supply.....	15
Findings.....	16
Recommendations.....	17
Appendix A. Methodology and Sources.....	18
Appendix B. Glossary.....	19

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SUMMARY

The Far North Center of Excellence for Labor Market Research prepared this report to provide a labor market analysis of educational supply and occupational demand for middle-skilled careers in the Far North subregion. This report aims to determine if demand in the local labor market is unmet by the supply from existing community college programs and other postsecondary training providers.

This report primarily focuses on training that leads to jobs in middle-skilled occupations - jobs that typically require education beyond a high school diploma but less than a Bachelor's degree - but may include higher-skilled occupations for training pathways that lead to a bachelor's degree. Lowered skilled occupations are rarely considered in this analysis due to the lessened barriers for entry-level work, such as no formal education and few on-the-job training requirements.

Key findings include:

- The Far North held 190 additive manufacturing-related jobs in 2022. Additive manufacturing-related jobs are projected to increase by 26% over the next five years, adding 49 new jobs to the subregion by 2027.
- Over the next five years, the three occupations of interest are projected to have 33 annual openings in the Far North subregion.
- Wage data shows that additive manufacturing-related occupations earn between \$19 and \$29 per hour, which is above the subregion's living wage of \$16.24 per hour. (See Appendix B for notes about the updated living wage).
- Awards data analysis shows that Far North training providers conferred an average of 38 awards (certificates and associate degrees) in Manufacturing and Industrial Technology programs over the last three academic years.

Recommendations include:

- The Far North Center of Excellence recommends exercising caution in developing a new program in additive manufacturing.

INTRODUCTION

The Far North Center of Excellence (COE) was asked to provide labor market information for a proposed program at a regional community college. This report focuses on the following Standard Occupational Classification (SOC) occupations and codes:

- Industrial Engineering Technologists and Technicians (17-3026)
- Computer Numerically Controlled Tool Operators (51-9161)
- Computer Numerically Controlled Tool Programmers (51-9162)

A review of related programs revealed the following Taxonomy of Programs (TOP) title(s) and code(s) are appropriate for inclusion in this report:

- Manufacturing and Industrial Technology (0956.00)

The corresponding Classification of Instructional Program (CIP) title(s) and code(s) are:

- Manufacturing Engineering Technology/Technician (15.0613)
- 3-D Modeling and Design Technology/Technician (15.1307)
- Industrial and Product Design (50.0404)

OCCUPATIONAL DEMAND

Exhibit 1 summarizes the five-year projected job growth for the studied occupations in the Far North¹, North/Far North, and California.

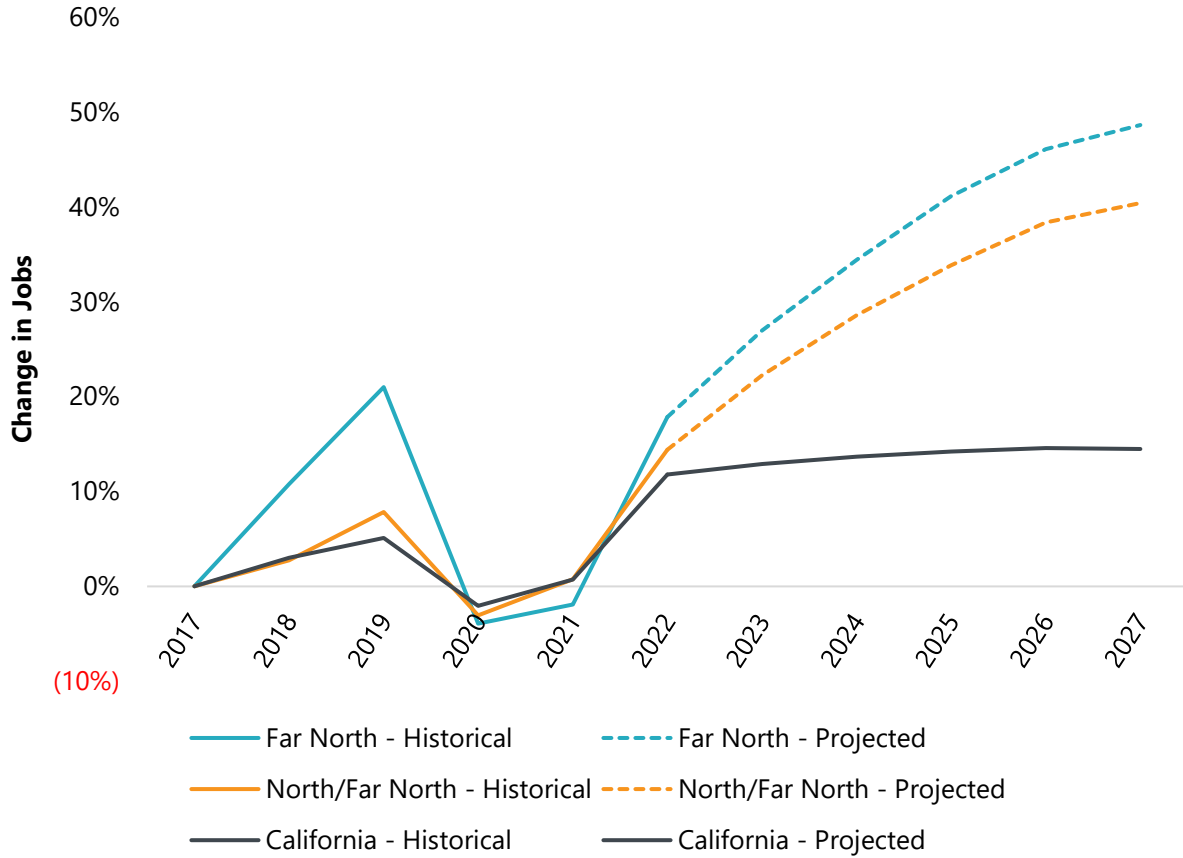
Exhibit 1. Employment and projected demand, 2022-2027

Occupation	2022 Jobs	2027 Jobs	2022-2027 Change	2022-2027 % Change	2022-2027 Annual Openings
Computer Numerically Controlled Tool Operators	144	175	31	22%	23
Computer Numerically Controlled Tool Programmers	26	36	9	35%	5
Industrial Engineering Technologists and Technicians	19	28	9	46%	4
Far North	190	239	49	26%	33
Computer Numerically Controlled Tool Operators	537	637	100	19%	82
Computer Numerically Controlled Tool Programmers	112	148	36	32%	21
Industrial Engineering Technologists and Technicians	128	169	41	32%	23
North/Far North	778	954	177	23%	125
Computer Numerically Controlled Tool Operators	15,578	15,325	(253)	(2%)	1,690
Computer Numerically Controlled Tool Programmers	2,680	2,969	289	11%	350
Industrial Engineering Technologists and Technicians	3,368	3,849	480	14%	450
California	21,626	22,143	517	2%	2,490

¹ The Far North subregion cover 15 counties, including Butte, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Plumas, Shasta, Sierra, Siskiyou, Tehama, and Trinity.

Exhibit 2 compares the percent change in jobs between 2017 through 2022 and the projected changes through 2027. The rate of change is indexed to the total number of jobs in 2017.

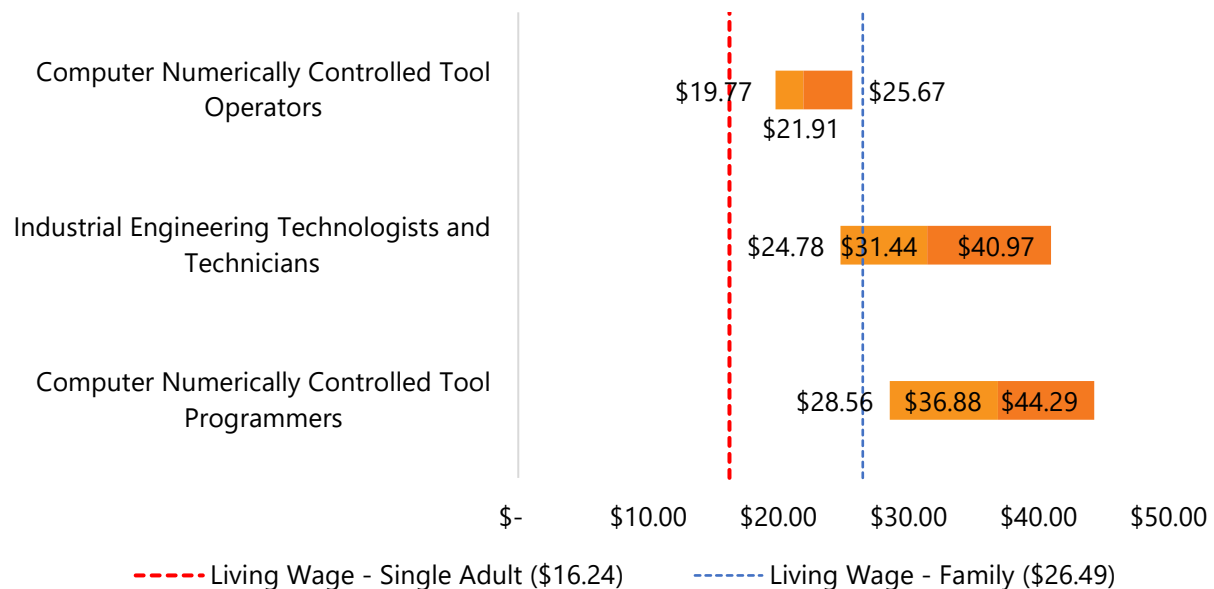
Exhibit 2. Changes in employment, 2017-2027



WAGES

Exhibit 3 compares the entry-level, median, and experienced wages for the selected occupations to the Far North living wage for a single adult (\$16.24 per hour) and a small family (\$26.49 per hour).^{2,3}

Exhibit 3. Comparison of wages by occupation, 2022



JOB POSTINGS

About Job Postings Analysis

This section analyzes recent data from online job postings. Online job postings may provide additional insight into recent changes in the labor market that are not captured by historical trends. However, please note that job postings are not the same as labor market demand; demand is based on projected annual openings. Job postings should be used to support inform community college curriculum development and to identify potential employers for targeted experiential learning opportunities.

Please note that there are several limitations to analyzing and interpreting online job postings. Employers may post a position multiple times to increase the number of job applicants. Job postings may remain online after a business chooses not to fill a position. Employers may advertise one posting to fill multiple vacancies. And, not all jobs are posted online.

² Living wage is defined as the level of income one working adult with no children must earn to meet basic needs, including food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs. Please note that the 25th-percentile and 75th-percentile hourly wages are used as proxy for entry-level and experienced-level wages.

³ A small family is defined as one working adult and one school aged child (between the ages of 5 and 12 years).

The Far North COE identified 370 online job postings for the selected occupations in the 15-county Far North subregion. Job posting data comes from Lightcast (formerly EMSI Burning Glass Labor Insights) and represents unique listings posted online within the last 15 months, from June 1, 2022, to August 31, 2023.

Occupations and Job Titles

Exhibit 4 details the number of online job postings for the selected occupations.

Exhibit 4. Number of job postings by occupation

Occupation	Job Postings	Share of Job Postings
Industrial Engineering Technologists and Technicians	355	96%
Computer Numerically Controlled Tool Programmers	11	3%
Computer Numerically Controlled Tool Operators	4	1%
Total Job Postings	370	100%

Exhibit 5 shows the top 10 relevant job titles with the most job postings.

Exhibit 5. Top jobs titles

Job Title	Number of Job Postings
Maintenance Technicians	77
Maintenance Aides	35
Highway Maintenance Workers	34
Road Maintenance Workers	15
Maintenance Technicians/Millwrights	14
Manufacturing Engineering Technicians	12
Field Mechanics	11
Machine Shop Supervisors	11
Production Technicians	10
Maintenance Workers	10

Employers

Exhibit 6 shows the top employers with the most job postings for the selected occupations.

Exhibit 6. Employers with the most job postings

Employer	Number of Job Postings
State of California	77
Rural Communities Housing Development Corporation	18
Pape Machinery	12
Sierra Pacific Industries	11
Altice USA	9
Pape Material Handling	8
Air Methods	7
Feather River College	7
Goodyear	5
Optimum4.0	5

Certifications, Skills, and Experience

Exhibit 7 shows the most relevant certifications requested by employers for the selected occupations.

Exhibit 7. Most in-demand certifications

Certification	Job Postings
Valid Driver's License	116
Class C License	30
Commercial Driver's License	29
Class B License	22
DOT Certification	15

Exhibit 8 shows the top 10 skills across three categories for the studied occupations: specialized, essential, and software skills.⁴

Exhibit 8. Most in-demand skills

Top 10 Specialized Skills	Top 10 Essential Skills	Top 10 Software Skills
Hand Tools	Communication	Microsoft Office (Access, Excel, Outlook, PowerPoint, Word)
Facility Repair and Maintenance	Operations	Inventory Control Systems
Heavy Equipment	Troubleshooting (Problem Solving)	PTC Creo (CAD Suite)
Sample Management	Self-Motivation	Microsoft Dynamics 365
Automation	Good Driving Record	Kronos (Timekeeping Software)
Machinery	Leadership	Mastercam (CAD/CAM Software)
Forklift Truck	Mechanical Aptitude	SAP Applications
Power Tool Operation	Lifting Ability	Mapping Software
Construction	Cleanliness	Database Software
Welding	Customer Service	AutoCAD

⁴ Specialized skills are those primarily required to perform specific tasks in an occupation. Essential skills are typically related to employability. These are skills that are prevalent across many occupations, and include both interpersonal attributes and learned skills (aka “soft skills”). Software skills are specific to any software tool or programming component used to support a job.

Exhibit 9 shows the minimum level of education requirements for related job postings in the Far North subregion.⁵

Exhibit 9. Employer-preferred education levels

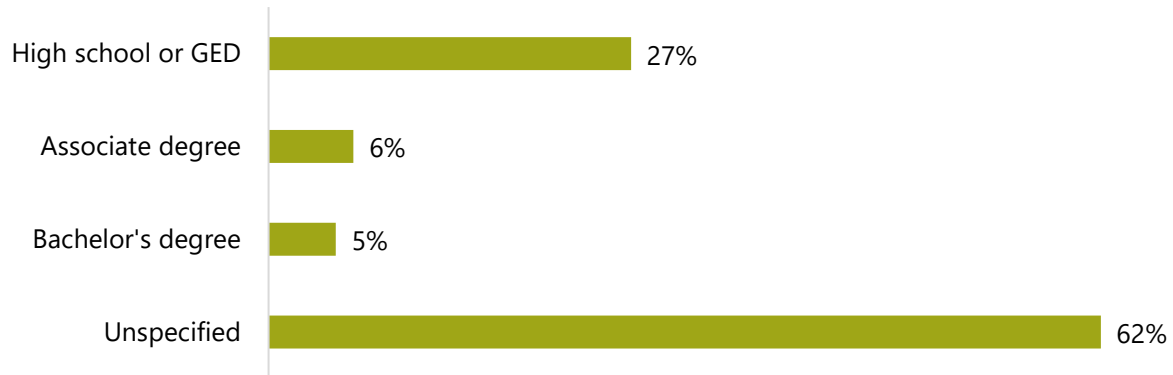
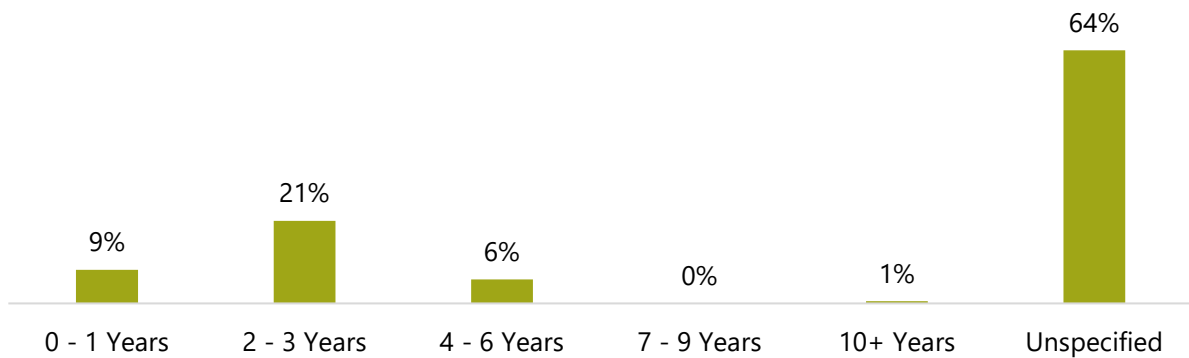


Exhibit 10 shows the experience levels required by employers for job postings for the selected occupations.⁶

Exhibit 10. Employer-preferred job experience



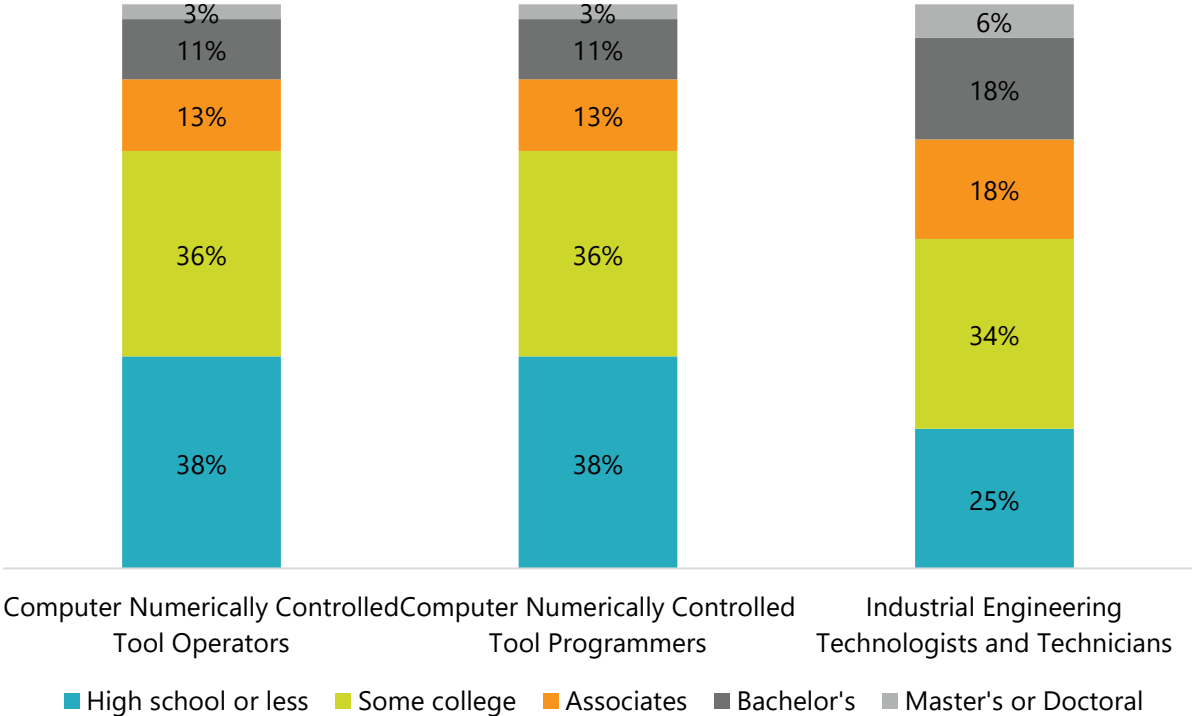
⁵ Employers may include more than one level of education as a hiring requirement in a job posting. As a result, the values in exhibit 9 may sum to greater than 100%.

⁶ Employers may include more than one level of experience as a hiring requirement in a job posting. As a result, the values in exhibit 10 may sum to greater than 100%.

EDUCATION AND TRAINING

The U.S. Census Bureau collects data on the highest level of education achieved by workers employed across all occupations. Exhibit 11 shows California’s educational attainment of the current workforce in the selected occupations.

Exhibit 11. California’s educational attainment for selected occupations



The U.S. Bureau of Labor Statistics (BLS) uses a categorical system to assign typical entry-level education and job requirements to each occupation for which the BLS publishes projection data. These categories include entry-level education, work experience in a related occupation, and on-the-job training. Exhibit 12 shows the selected occupations' typical entry-level education and job requirements.

Exhibit 12. Typical entry-level education and job requirements

Occupation	Typical Entry-level Education	Work Experience Required	On-the-job Training Required
Industrial Engineering Technologists and Technicians	Associate degree	None	None
Computer Numerically Controlled Tool Programmers	Postsecondary nondegree award	None	Moderate-term
Computer Numerically Controlled Tool Operators	High school diploma or equivalent	None	Moderate-term

EDUCATIONAL SUPPLY

Educational supply for an occupation can be estimated by analyzing the number of awards issued in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes. Exhibit 13 shows the TOP and CIP codes for educational programs related to the selected occupations.

Exhibit 13. TOP and CIP codes for training programs related to the selected occupations

TOP Programs and Codes	Aligned CIP Programs and Codes
Manufacturing and Industrial Technology (0956.00)	Manufacturing Engineering Technology/Technician (15.0613)
	3-D Modeling and Design Technology/Technician (15.1307)
	Industrial and Product Design (50.0404)

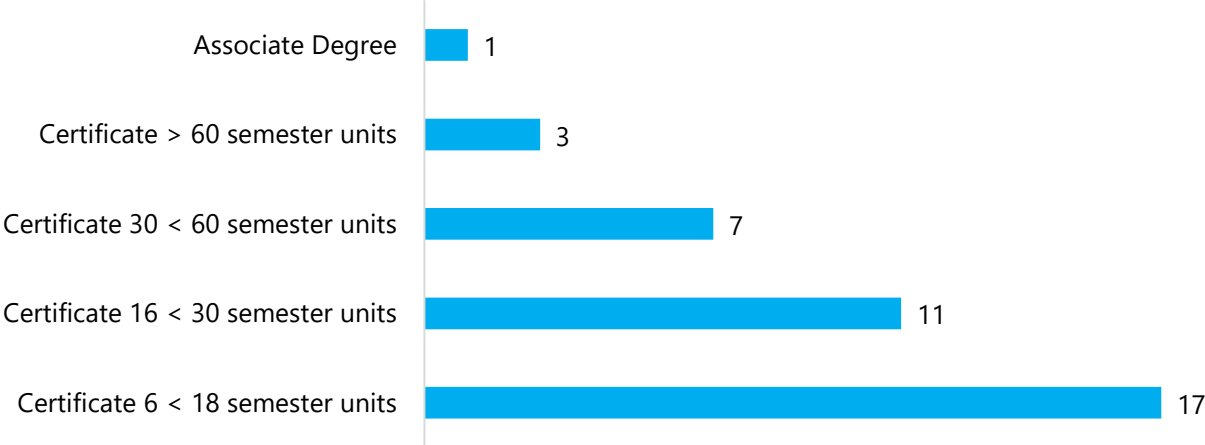
Community College Supply

Exhibits 14 and 15 compare the average number of certificates and degrees from selected Far North community college programs over the last three academic years.

Exhibit 14. Annual average community college awards by program

Program - TOP Code	College	Annual Awards 2019-20	Annual Awards 2020-21	Annual Awards 2021-22	3-Yr Annual Awards Average
Manufacturing and Industrial Technology (0956.00)	Butte	14	33	61	36
	Redwoods	3	1	0	1
	Shasta	2	0	1	1
	Subtotal	19	34	62	38
	Grand Total	19	34	62	38

Exhibit 15. Annual average community college awards by type, 2019-20 through 2021-22



Other Postsecondary Supply

Non-community college training providers did not confer any awards in the Far North over the last three academic years. Please note that non-community college data lags by one year.

FINDINGS

This report focuses on three occupations related to additive manufacturing: Industrial Engineering Technologists and Technicians (17-3026); Computer Numerically Controlled Tool Operators (51-9161); and Computer Numerically Controlled Tool Programmers (51-9162).

Occupational Demand and Wages

- The Far North subregion held 190 additive manufacturing-related jobs in 2022. These jobs are projected to increase by 26% over the next five years, adding 49 new jobs to the subregion by 2027.
- Jobs for the occupations of interest are projected to grow faster in the Far North subregion than in California.
- Over the next five years, the three additive manufacturing-related occupations are projected to have 33 annual openings across the Far North.
- Analysis of wage data shows that the three occupations studied in this report earn between \$19 and \$29, which is above the single adult living wage of \$16.24 per hour.

Job Postings

- According to real-time labor market information, there were about 370 online job postings for the three additive manufacturing-related occupations between June 1, 2022, and August 31, 2023.
- A few of the most common job titles include maintenance technicians and aides, as well as highway maintenance workers.

Education and Training Requirements

- Between 49% and 52% of incumbent workers in the studied occupations have educational attainment levels consistent with community college offerings (some college or associate degrees). Another 11% to 18% of workers in these occupations hold a bachelor's degree.

Postsecondary Supply

- Three Far North community colleges offer degrees and certificates in programs related to one or more of the three occupations studied in this report. Together, these programs conferred an average of 38 awards (certificates and associate degrees) in Manufacturing and Industrial Technology programs over the last three academic years (2019-20 through 2021-22).
- Non-community college training providers did not confer any awards in the Far North over the last three academic years. Note: non-community college data lags by one year.

RECOMMENDATIONS

- Based on projected yearly openings and average annual awards in the Far North subregion, there seems to be a balance between educational supply and occupational demand.
 - Community colleges and other postsecondary training providers issued an average of 38 awards over the last three years.
 - There are 33 projected annual openings for the three additive manufacturing-related occupations.
- The Far North Center of Excellence recommends exercising caution in developing a new program in additive manufacturing.

New Program Recommendation		
Move forward with the new program	Proceed with caution	A new program is not recommended
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

APPENDIX A. METHODOLOGY AND SOURCES

This report identified Occupations using the Center of Excellence TOP-to-CIP-to-SOC crosswalk and O*Net OnLine. This report's findings were determined using labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau data from Emsi, and jobs posting data from Burning Glass.

"The Chancellor's Office Curriculum Inventory System (COCI)." California Community Colleges Curriculum Inventory (COCI), 2023. <https://coci2.ccctechcenter.org/>.

Glasmeier, Amy K. "Living Wage Calculator." Living Wage Calculator, 2023. <https://livingwage.mit.edu/>.

Integrated Postsecondary Education Data System (IPEDS). National Center for Education Statistics. U.S. Department of Education. <https://nces.ed.gov/ipeds/>.

Labor Market Information Division. California Employment Development Department. <https://labormarketinfo.edd.ca.gov/>.

Lightcast (Formerly EMSI/Burning Glass) 2023.3; QCEW Employees, Non-QCEW Employees, and Self-Employed. <https://www.economicmodeling.com/>. (Note: EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors)).

Management Information Systems (MIS) Data Mart. California Community Colleges Chancellor's Office. <https://datamart.cccco.edu/>.

O*NET OnLine. U.S. Department of Labor/Employment and Training Administration (DOL ETA). <https://www.onetonline.org/>.

Self-Sufficiency Standard Tool for California. The University of Washington. <http://www.selfsufficiencystandard.org/>

"Taxonomy of Programs." California Community Colleges Chancellor's Office. June 2012, 6th Edition. <https://www.cccco.edu/-/media/CCCCO-Website/About-Us/Divisions/Educational-Services-and-Support/Academic-Affairs/What-we-do/Curriculum-and-Instruction-Unit/Files/TOPmanual6200909corrected12513pdf.ashx>

"TOP-CIP-SOC Crosswalk." Centers of Excellence for Labor Market Research. June 2021 Edition. <http://coecc.net/>

APPENDIX B. GLOSSARY

Key Terms	Definition
Occupation	<p>Occupation refers to a category of jobs, careers, or professions that are similar regarding the work performed and the skills the workers possess. Workers who perform essentially the same tasks are in the same occupation, whether in the same industry. Some occupations are concentrated in a few industries, while others are found in many industries.</p> <p>Occupations differ from jobs in that jobs show the number of positions held in each occupation.</p>
Jobs	<p>A job is a specific instance of employment and includes any position where a worker provides labor for monetary compensation.</p> <p>Job numbers include employees (those who work for businesses) and proprietors (those who work for themselves). Full- and part-time jobs are included and counted equally (i.e., not adjusted to full-time equivalents). Data for jobs, or employment, are annual averages.</p>
Employment	<p>Employment refers to filled jobs, whether full- or part-time, temporary or permanent. The scope of "who" is counted as employed is noted in Appendix A. Methodology and Sources.</p>
Job Change	<p>Job change is the net increase or decrease of jobs over a given timeframe.</p>
Job Opening	<p>Job openings are the projected number of positions available for workers entering an occupation.</p> <p>Openings include growth and replacement job counts. Growth job counts are the positive change in the total number of workers employed. Replacement job counts are the estimates of new workers needed to replace workers permanently leaving the occupation.</p>
Percentile Wage (or wages)	<p>A percentile wage is the value of a wage at which a certain percentage of workers falls below. For example, a 25th percentile hourly wage of \$15.00 indicates that 25% of workers earn less than \$15.00, while 75% earn more. Percentile wages are specific to the geography shown in the report.</p> <p>The 25th-percentile and 75th-percentile hourly wages are used as a proxy for entry-level and experienced-level wages.</p>
Living Wage	<p>The living wage is the level of income a single, working adult with no children must earn to meet basic needs. The living wage is calculated using basic allowances for food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs, and assumes full-time employment (40 hours per week, 52 weeks a year).</p>

Key Terms	Definition
	Beginning AY 2023-24, NFN COE adopted the MIT calculations for a living wage better aligned to the economic conditions following the pandemic. For additional information, please visit https://livingwage.mit.edu/ .
Educational Attainment	Educational attainment is the highest level of education achieved by workers in an occupation. The data include workers aged 25 years and older.
Typical Entry-level Education	<p>The education level most workers need to gain employment in an occupation. Categories range from "no formal educational credential" and "high school diploma or equivalent" to "doctoral or professional degree." The types most relevant to community training are "some college, no degree," "postsecondary nondegree award," and "associate degree."</p> <p>The typical entry-level education may differ from the actual educational levels attained by workers employed in an occupation.</p>
Typical Work Experience	The relevant prior experience a worker needs to gain employment in an occupation. Categories include "5 years or more", "less than five years," and "none."
Typical On-The-Job (OTJ) Training	The level of on-the-job training a worker needs to obtain for competency in the skills required for an occupation. Categories include "none," "short-term (1 month or less)," "moderate-term (more than one month but less than 12 months)," "long-term (more than 12 months)," "apprenticeship," and "internship/residency."
Awards	Awards are the number of certificates and degrees conferred for a specific course of study each year. Awards count "papers" and, as a result, may be greater than the number of students who complete a program.

COVID-19 Statement: This report includes employment projection data produced by Lightcast (formerly EMSI). Employment projections are developed using models based on historical data, which in this set of projections covers the period through 2021. Most input data, therefore, precedes the pandemic. Employment projections are long-term projections intended to capture structural changes in the economy, not cyclical fluctuations. As such, projections data are not intended to capture the impacts of the recession that began in February 2020. Cyclical fluctuations, like recessions, impact projects when they become part of the historical data set.

Important Disclaimer: All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon components or recommendations contained in this study.

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Centers of Excellence for Labor Market Research, Economic and
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