

El Camino College
Program Review
Career and Technical Education - Supplemental Questions 2015
Machine Tool, Engineering, & Manufacturing Technology
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Fall 2015

I. PROGRAM OVERVIEW

Summary

The Machine Tool and Manufacturing Technology programs are both designed to prepare students for employment and to upgrade and expand the skills, knowledge, and abilities (SKAs) of those currently employed in these endeavors and related fields. Many of the SKAs developed in these two programs may seem similar but they differ in focus. The focus of Machine Tool program is to develop skills and competency within the job shop, tool room, or laboratory environment where a small number of specialized items are designed, created, or tested whereas the focus of the Manufacturing Technology program develops skills that are conducive to mass production, highly automated machining equipment, and automation used in the manufacturing environment.

Mission Statements

Machine Tool Technology:

The Machine Tool Technology program prepares students for employment in machine shops, tool rooms, and instrument and experimental laboratories and provides upgrade opportunities for employed industrial personnel. Students gain proficiency in the set-up and operation of drilling machines, lathes, mills, grinders, electrical discharge machines, computer numerical control (CNC) lathes, CNC milling machines, and computer aided manufacturing systems. Competencies will be assessed regularly in accordance with skill standards established by the National Institute of Metalworking Skills (NIMS). Students completing the program may enter industry as an advanced apprentice machinist or machine operator and anticipate advancement to machinist, tool and die maker, experimental machinist, or numerical control programmer.

Manufacturing Technology:

The Manufacturing Technology program prepares students for employment in fields related to manufacturing. By completing the degree or certificate requirements, students acquire a foundation in computer aided design, machining, electronics, technical mathematics, and welding. Students also select a career field in which to specialize or broaden their knowledge. These fields include computer aided design/drafting, electronics, environmental technology, machine tool technology, quality assurance, and welding. Competencies are assessed regularly by student performance in the classroom and laboratory.

Manufacturing Technology:

The Manufacturing Technology program prepares students for employment in fields related to manufacturing. By completing the degree or certificate requirements, students acquire a foundation in computer aided design, machining, electronics, technical mathematics, and welding. Students also select a career field in which to specialize or broaden their knowledge. These fields include computer aided design/drafting, electronics, environmental technology, machine tool technology, quality assurance, or welding. Competencies are assessed regularly by student performance in the classroom and

laboratory.

1. How strong is the occupational demand for the program? Analyze demand over the past 5 years and project demand for the next 5 years, addressing state and local needs for the program.

Occupational demands for the Machine Tool Technology (MTT) and Manufacturing Technology (MT) programs will remain steady with no growth according to some organizations. Other organizations forecast that there will be 2 million unfilled openings in the USA during the next 10 years. It is very hard to say with this kind of movement in the various groups that forecast what the employment outlook is.

National Institute of Metalworking Skills (NIMS), a federal watchdog of metalworking skills and manufacturing, forecasts that there will be 2 million unfilled jobs in manufacturing during the next 10 years. This covers everything from beginning machining to prototypes, mold makers, maintenance machinist, tool and die, and millwrights. At this time, the country is trying to reverse the trend that was caused by eliminating vocational classes in the high schools during the 70's. At present, NIMS is taking drastic measures to get enough people trained to replace an aging work force.

The Wall Street Journal (WSJ) says that manufacturing has been in contraction of 1% per quarter for the past 5 quarters. To get the economy back on track after the recession, manufacturing leads the way for the first time in history. Usually the housing industry leads the comeback but it stayed flat and manufacturing was the leader for creating jobs and income. WSJ predicts that the manufacturing sector will continue to contract at about 5% for the next 5 years.

Bureau of Labor Statistics (BLS) says that machining and manufacturing has decreased at a pace of 1% for the last 3 years. BLS also predicts that this sector will continue to reduce at a rate of 1% per year for the next 5 years. This will be due to not being able to replace the aging workforce and being forced to get done in other countries. Another factor that affects the industry is that the industry is using more automation and becoming more efficient. The other item that hurts manufacturing in the USA is the strength of the dollar. Value of the dollar in the exchange rate or other currencies makes USA products very expensive in other countries.

Locally, BLS predicts that there will be a 1% contraction of machining and manufacturing in the Southern California area and in the State of California. Although this is claimed by the BLS, the company representatives on the ECC advisory council noted they are "hiring with caution." This means that the company is not willing to train the new employee from the start but they will take a person who has the skill sets that the company is seeking. Along

with minimal training, and formal training at the community college level, the company hopes that the person brings other useful skills.

In summary, the best that can be said is that this sector of the economy is maintaining its level very close to what it is now, providing that there is no major hiccup in the world.

2. How does the program address needs that are not met by similar programs in the region?

The occupational demand machine tool and manufacturing programs are strong and growing. El Camino College has an excellent program. The demand for the program has grown over the last five years and is expected to continue to grow over the next five years. The Bureau of Labor Statistics Occupational Outlook Handbook (2016-2017 Edition) projects the number of machinists and tool and die makers to grow six percent over the 2014-2024 decade, about as fast as the average for all occupations. Workers familiar with computer software applications and who can perform multiple tasks in a machine shop will have the best job opportunities. Source: <http://www.bls.gov/ooh/production/machinists-and-tool-and-die-makers.htm>

The decline is due in part to increasing efficiency of machinists brought about by advances in CNC machine tools and automated processes. Because the BLS estimates the number of machinists retiring or leaving the workforce to exceed the number of entrants, job opportunities for machinists continue to be good. Technology advances are not anticipated to affect machinist employment because they maintain their own automated systems and have a wide range of skills. California has the highest number of job opportunities in the nation.

Machinist positions are expected to comprise 2.28 out of every 1,000 jobs in Los Angeles-Long Beach-Glendale and 4.08 out of every one thousand jobs offered in the Santa Ana-Anaheim-Irvine Metropolitan Area. The middle 50 percent of machinists earned between \$15.10 and \$24.01 with the median wage of \$19.22 per hour. Source: <http://www.bls.gov/oes/current/oes514041.htm>

The California State University engineering programs at Long Beach, Los Angeles and Northridge have limited machine tool and robotics equipment for students. Santa Monica and Harbor Colleges do not offer MTT or MTEC programs. Long Beach City College eliminated their machine tool program about three years ago. Currently Long Beach City College offers a limited mechanical maintenance program. Cerritos College machine tool program is well equipped. As a result of Long Beach City College closing their program altogether and limited laboratory capacity at local California State University programs, Machine Tool & Manufacturing Technology Programs demand has increased. Many CSU students are advised to supplement their education with MT and MTEC classes at Cerritos or El Camino College.

One training site not mentioned is Los Angeles Trade Tech College. They are about the same distance from ECC as Cerritos is. That distance is about 20 miles. There are many colleges in the area, but none of them offer the same machine and manufacturing training in a close area.

At ECC, students can take many classes that deal with machine tool operations or classes in manufacturing. Classes start with the use of basic hand tools and measurement and work up to include Computer Numerical Control (CNC) programming, CNC operations and a possibility for robot programming and operations. Students can earn a mini certificate in CNC Operator. Students can earn a Certificate of Achievement Machinist Option, Certificate of Achievement Programming Option, Certificate Achievement Manufacturing or an A.S. degree in Machine Tool or Manufacturing.

The latest report says:

During 2012-2013 school year, 13 certificates were earned in MTT.

During 2012-2013 school year, 22 certificates were earned in MT.

During 2013-2014 school year, 37 certificates were earned in MTT.

During 2013-2014 school year, 1 certificate was earned in MT.

All of this addresses the need of local manufactures.

3. What are the completion, success, and employment rates for the students? Discuss any factors that may impact completion, success, and employment rates.

During the spring semester of 2015, the completion and success rate for Industry and Technology Division was 85% and 76%. The same semester for MTT was 72% and 65%. MTT reports 69 total grades. There is no data for MT. ETEC was at 99% and 97%. ETEC reports 166 total grades.

During the fall 2015 semester, all classes that had a machine lab component were closed because the machine lab was not ready for operation after the ITEC Building remodel; also the reason for the low total grades reported. The classes offered that semester were MTT 10J (MasterCAM), MTT 10A (Introduction to CAD/CAM), and MTT 40 (Shop Calculations). These are very challenging lecture-type classes and could be the reason for the lower completion/success rates compared to the Industry and Technology Division.

The number of total grades in ETEC was created due to the implementation of the second semester of concurrent enrollments with the high schools.

During the fall semester of 2014, the completion and success rate for Industry and Technology Division was 85% and 76%. The same semester for MTT was 86% and 80%. MTT reports 130 total grades. MTEC was at 92% and 83% and reports 12 total grades. ETEC was at 97% and 95%. ETEC reports 424 total grades.

The completion/success rates for MTT were aligned with the Industry and Technology Division. This was the last semester that MTT was in the swap space for the remodel.

ETEC numbers are high on total grades due to implementation of the first semester of concurrent enrollments with the high schools after major cut backs in class offered at the college. New funding became available after about three years of cancelling classes for budget reasons. Since there was a major jump in completion/success rates, that can be contributed to high school enrollments.

During the spring semester of 2014, the completion and success rate for Industry and Technology Division was 87.2% and 77.5%. The same semester for MTT was 84% and 79.3%. There were 150 total grades reported. No data for MT. ETEC was at 84.8% and 73.9% for completion/success. ETEC reports 46 total grades.

During the fall semester of 2013, the completion and success rate for the Industry and Technology Division was 87.0% and 74.8%. The same semester for MTT was 90.3% and 79.3%. A total of 237 grades were reported in MTT. MT was at 90% and 85%. MT reported a total of 20 grades. ETEC was at 65% and 40%. ETEC reports 40 total grades.

The above data shows that MTT, ETEC and MT were at the same level or slightly lower than the Industry and Technology as a whole. The only semester that could be interpreted to be weak was the spring of 2015, and this was the semester all classes with a lab component was closed due to the remodeling of the ITEC Building.

As for employment rates for students, there is no a vehicle or mechanism available for tracking the students. If one should be created, not only should it track the employment rate but also promotions, raises in- house promotions and increase in title or increase of pay that is caused by a switch in jobs. The tracking would be nice to also follow any activity that would contribute to the student's success due to their schooling.

4. If there is a licensure exam for students to work in their field of study, please list the exam and pass rate.

In MTT, ETEC and MT there are no exams for licensing students at the two-year college level. The exam and certification used for MTT is the NIMS certification for MTT. MTT is very active in this area of certification and many grant activities are linked to NIMS testing and success. During the last 2 years, over 40 students have taken the NIMS test with only 2 not passing.

5. Is the advisory committee satisfied with the level of preparation of program graduates?

Advisory committee members state satisfaction with the entry-level preparation of students. They state ECC does an adequate job in this area. ECC uses a general approach of teaching a small amount about everything that has to do with manufacturing. We do not specialize in just one subject due to the fact that we do not know where the student will be employed after leaving the program.

ECC MTT is not a “training center “for just one company. Although Northrop Grumman would like more training in CNC operation, set-up, programming and procedures, when a company like Chevron Oil has one CNC water jet and the rest are conventional machines. Chevron Oil would like to see more training in conventional operation (Space X is interested in developing an entry-level manufacturing apprenticeship at ECC). When our students complete the program, they have a well-rounded education in manufacturing where they can fit into many different companies. It is up to the student and the company to receive the specialized training that the company requires. As the reader can see, ECC covers a broad spectrum in the area of manufacturing.

EL CAMINO COLLEGE
ARM Center Advisory Minutes
April 22, 2015
Alondra Room, Above Bookstore
6:15 p.m. to 7:30 p.m.

Attendees: Ed Hofmann (EH) ECC, Eric Carlson (EC) ECC, Victor de la Torre (NT) ECC, Dr. Jeff Padin (JP) ECC, Ron Way (RW) ECC, Victor Brown, Alcoa Fastening Systems, Mark Edmonds, Northrop Grumman, Arthur Gomez, CSULB, Joaquin Guillen, Northrop Grumman, Dennis Jimenez, Northrop Grumman, Christian McAuliffe, HAAS Factory Outlet, Don McKinzie, Northrop Grumman, Jay Phillips HAAS Factory Outlet, David Ritchie, Northrop Grumman, Andy Roberts, Northrop Grumman, David Tolin, PML Inc., Marty Mechsner, Industrial Metal Supply

Welcome and Introductions

Program update/Enrollment:

EH and EC explained to the committee that ECC ARM Center was at the end of the move from the remodeling of the ITEC building. EH told of the classes that were cancelled because the ARM center was not ready for classes. This caused the number in the program to look low. ARM Center staff expected the numbers to return when all classes were offered again.

Schedule of Classes

Again, classes were cut back to lecture only classes. These classes were the MTT 10J (MasterCAM), MTT 10A (Introduction to CAD/CAM), MTT 40 (Shop Calculations) and ETEC16B (CIM) at CAMS High School. The next semester was expected to have all classes back at full strength.

Engineering Technology was effected by the move too. Classes were cancelled in this department also.

STEM funding helped get new equipment in place at the ARM Center. Equipment was as follows: 5 axis HAAS office mill, Southwestern 2OP Mill, Wire EDM machine (ordered), and Water Jet machine (pending).

Remodel of ITEC building

EH and EC told about problems, seen and unseen, about the remodel and the move. They told about the projected schedule of opening the lab. They told of the lab classes expected for the summer: 2 MTT 101 and a MTT 10J. During this section, committee was told that there would be no tours of the Center tonight because it was not ready.

The committee was informed about plans for grant and summer school class planned for the summer at ECC and Compton College.

Open discussion included topics of 3D printing, the Gene Haas scholarships where 28 high students from 4 different high schools got the scholarships, shop classes back into the high schools and PLTW high school students don't go to ECC.

A discussion followed. The topic was "Should ECC offer a class like "Programming with CATIA"? ECC had a class MTT 11 (programming with CATIA but was deactivated for low or nonexistent enrollments. The class had a prerequisite of CATIA 31. Students would not take the prerequisite class but wanted to take the MTT 11 class. Enrollments in the class were always low. Class was deactivated.

EH took the CATIA 31 and 32 class while the center was closed. In conversation with the instructor, Doug Glenn, EH found out that CADD 31 had 120 candidates take could take MTT 11 and that MTT 11 was not being marketed in the CATIA classes. EH thought it would be a good idea to reinstate the MTT 11 class so that the MTT students would have another option for graduating with a Programming degree. He asked the Dean about this and was told to poll the industry committee, which he did.

The general poll was the industry used CATIA for design but the need for programming was filled with other software like MasterCAM, Unigraphics, Surfcam and Gibbs. Nobody on the committee used CATIA for programming. Idea was gone now.

Committee was asked to fill out a survey produced by Industry and Technology as the meeting was breaking up. Many of the committee members wanted to see the ARM Center and EH and EC said ok and took the committee to the center. Ther survey was given to all the members as they were leaving the Alondra Room and many said they would mail the survey to us. We did not receive any surveys in the mail.

12 surveys were turned in while the committee was leaving the ARM Center.

Survey #1

Section 1; Manufacturing

Demand for industry in South Bay: **Super high**

Hourly wage: CNC machinist \$18 to \$20 per hour

Engr Tech \$17.50 per hour

Manufacturing Tech/Assembler \$16 per hour

Section 2; Technical skill sets

Read engineering drawings, precision measurement, Workplace safety

Type of computer skills:

Any 3D CAD and CAM system, Conventional machines, CNC mill, Lathe

Section 3; Soft Skills

All soft skills are “very important” except for integrity and empathy which are “somewhat important”

Section 4; Academic Skills

Basic math and Ability to read technical material is “very important”. Professional writing “not important.

All else is “somewhat important.

Section 5; Technical Training and Education

State certification/license industry certification and Bachelor’s year degree are “not important”. All else are “Somewhat important”

Section 6; Licensure and Industry Certifications

National: NIMS desired

Section 7; Other Skill Training

Reliable, Loyal, Honest

Section 8; How are we doing?

El Camino College is responsive to my needs as an employer. **Strongly Agree**

The courses that ECC offers address the skills needed for my industry. **Agree**

ECC adapts quickly to changes in my industry. **Neutral**

ECC adapts quickly to changes for training employees in my industry. **Neutral**

ECC is an approachable, collaborative partner. **Strongly Agree**

ECC students employed in my business/industry are well-prepared for the workforce. **Strongly Agree**

Section 9; interested in offering a paid internships to students? **No**

Survey #2

Section 1; Manufacturing

Demand for industry in South Bay: **high**

Hourly wage: Apprentice \$15 per hour.

Section 2; Technical skill sets

Blue print reading, Math skills, familiar with tools and cutters

Type of computer skills:

MasterCAM or Gibbs

Section 3; Soft Skills

All soft skills are “very important” except for empathy which are “somewhat important”

Section 4; Academic Skills

Professional writing and Technical writing are “not important”. Advanced math is “Somewhat important”. All others are “very important”.

Section 5; Technical Training and Education

State certification/license industry certification and Industry certification are “not important”. Some college courses are “Somewhat important”. All else are “Very important”

Section 6; Licensure and Industry Certifications

No Answer

Section 7; Other Skill Training

Multiple axis CADing, Lathe-live tooling

Section 8; How are we doing?

El Camino College is responsive to my needs as an employer. **Strongly Agree**

The courses that ECC offers address the skills needed for my industry. **Strongly Agree**

ECC adapts quickly to changes in my industry. **Strongly Agree**

ECC adapts quickly to changes for training employees in my industry. **Agree**

ECC is an approachable, collaborative partner. **Strongly Agree**

ECC students employed in my business/industry are well-prepared for the workforce. **No Answer**

Section 9; interested in offering a paid internships to students? **No Answer**

Survey #3

Section 1; Manufacturing

Demand for industry in South Bay: Average

Hourly wage: Operator \$13

Programmer\$22

Section 2; Technical skill sets

Manual Machines

Type of computer skills:

No Answer

Section 3; Soft Skills

No Answers

Section 4; Academic Skills

No Answers

Section 5; Technical Training and Education

State certification/license industry certification, Community college, Associate degree and Bachelor's year degree are “Somewhat important”. All else are “Very important”

Section 6; Licensure and Industry Certifications

No Answer

Section 7; Other Skill Training

NIMS and A.S, Degree

Section 8; How are we doing?

El Camino College is responsive to my needs as an employer. **Agree**

The courses that ECC offers address the skills needed for my industry. **Strongly Agree**

ECC adapts quickly to changes in my industry. **Agree**

ECC adapts quickly to changes for training employees in my industry. **Neutral**

ECC is an approachable, collaborative partner. **Agree**

ECC students employed in my business/industry are well-prepared for the workforce. **Agree**

Section 9; interested in offering a paid internships to students? **No Too far...60 miles**

Survey #4

Section 1; Manufacturing

Demand for industry in South Bay: Average

Hourly wage: Entry level machinist/CNC operator \$15

CNC programmer-set-up \$25

Section 2; Technical skill sets

Speeds and Feeds, Tool application

Type of computer skills:

Gibbs CAM, manual CMM, Fanuc CNC control, FADAL CNC, HAAS CNC

Section 3; Soft Skills

All soft skills are “Somewhat important” except for Ability to communicate effectively, Show up for work on time, and Follow instructions/procedures which are “very important”.

Section 4; Academic Skills

Technical writing is “Not important”. Basic math, Geometry and Advanced math is “Very important”

All else is “somewhat important.”

Section 5; Technical Training and Education

State certification/license industry certification, Industry certification, Community college specialization certificate and Associate degree is “Somewhat important”. Bachelor’s year degree are “not important”.

Some college courses are “Very important”.

Section 6; Licensure and Industry Certifications

None

Section 7; Other Skill Training

No Answer

Section 8; How are we doing?

El Camino College is responsive to my needs as an employer. **Agree**

The courses that ECC offers address the skills needed for my industry. **Agree**

ECC adapts quickly to changes in my industry. **Agree**

ECC adapts quickly to changes for training employees in my industry. **Neutral**

ECC is an approachable, collaborative partner. **Neutral**

ECC students employed in my business/industry are well-prepared for the workforce. **Agree**

Section 9; interested in offering a paid internships to students? **No**

Survey #5

Section 1; Manufacturing

Demand for industry in South Bay: High

Hourly wage: \$16.50

\$30.00

Section 2; Technical skill sets

Run all manual machines and beginning CNC skills

Type of computer skills:

Lathes, Mills, Grinders, CNC, MasterCAM

Section 3; Soft Skills

All soft skills are “very important” except for Good manners and Empathy which are “somewhat important”

Section 4; Academic Skills

Basic math and Geometry are “very important”. Professional writing is “not important. All else is “somewhat important.”

Section 5; Technical Training and Education

State certification/license industry certification, Industry certification and Community college specialization certificate are “Somewhat important”. All else are “Very important”

Section 6; Licensure and Industry Certifications

Associate degree

Section 7; Other Skill Training

MasterCAM and Machining

Section 8; How are we doing?

El Camino College is responsive to my needs as an employer. **Strongly Agree**

The courses that ECC offers address the skills needed for my industry. **Agree**

ECC adapts quickly to changes in my industry. **Agree**

ECC adapts quickly to changes for training employees in my industry. **Agree**

ECC is an approachable, collaborative partner. **Agree**

ECC students employed in my business/industry are well-prepared for the workforce. **Strongly Agree**

Section 9; interested in offering a paid internships to students? **Not at this time**

Survey #6

Section 1; Manufacturing

Demand for industry in South Bay: **Growing with continued growth**

Hourly wage: Manufacturing technician \$18

Section 2; Technical skill sets

Work Ethic, Mechanical aptitude, communication skills, spoken and written Ethical behaviors

Type of computer skills:

PC and MasterCAM

Section 3; Soft Skills

All soft skills are “very important”

Section 4; Academic Skills

Advanced math, Professional writing, and Technical writing are “Somewhat important”. All else is “Very important”.

Section 5; Technical Training and Education

All are “Somewhat important” except the Community College specialization certificate which is “Very important”.

Section 6; Licensure and Industry Certifications

MTT Certificate and A.S. MTT Degree

Section 7; Other Skill Training

Understanding of Design for Manufacture as well as Manufacturing Productivity

Section 8; How are we doing?

El Camino College is responsive to my needs as an employer. **Strongly Agree**

The courses that ECC offers address the skills needed for my industry. **Strongly Agree**

ECC adapts quickly to changes in my industry. **Agree**

ECC adapts quickly to changes for training employees in my industry. **Agree**

ECC is an approachable, collaborative partner. **Agree**

ECC students employed in my business/industry are well-prepared for the workforce. **Agree**

Section 9; interested in offering a paid internships to students? **Yes. Northrop Grumman Don Mckinzie (310) 813-6856**