

Machine Tool Technology

2019 Program Review

MJC Program Review 2019

Modesto Junior College's Program Review process is divided into 3 sections:

- Program Analysis (SWOT Analysis)
- Goal Setting and Activities
- Resource Request

Program Analysis

Internal Strengths

1. What strengths does the analysis of student data reveal?

Mixed demographic of students, a retention rate that matches evenly with the region, an upward trend of awards achieved by students, a high amount of previous enrollees that are meeting a living wage, and a substantial amount of students that are employed after a year of education in the Machine Tool Field.

2. Are there specific aspects of the program that are exemplary or could serve as a model?

I think the data that stands out the best is that out of the graduates from the Machine Tool Program 91% attained a living wage for Stanislaus County. This is in comparison to the College average of only 55%. To me this means that students are building skills with us that make them more valuable in industry. The knowledge and skills that they attain while at MJC, are relevant to local employers, and directly affecting the income that the student can earn.

3. What do others see as the program's strengths?

Consistency in class offerings both in the mornings, evenings, and Summer Semester to adapt with working professionals careers. Newer technology advancements in equipment and tooling. Growth in career opportunities and job offerings over the past few years. An environment that teaches problem solving, allows for errors, and curriculum that caters to a student to meet their specific career goals. (Exp: Students can focus on Manual Machining and achieve a Maintenance Machining Certificate, or continue to grow and advance in the trade focusing on on CNC Machining)

4. How well are students meeting program learning outcomes, skills, or competencies; and how are they relevant to careers in your discipline or industries for which you help prepare students?

Students are doing well meeting the learning outcomes, skills, and competencies, in the intro classes. These skills are probably the most important as a foundation of machining. I find that a lot of our students only take these intro classes as they just want to get an idea of how the machinery works and that either they personally are satisfied with what they came to achieve, or their employer is satisfied with what they were able to learn here. In the Intro to Manual Machining a student will learn how to setup and operate a Manual Lathe and Manual Milling Machine. These two machines are the most common machines required to make most products the industry utilizes.

Internal Weaknesses

5. What gaps are observed by reviewing the student data?

I think the largest gap that I can easily recognize is the minimal amount of students that are completing the program. Local employers are actually a large factor in determining this data. If an employer requires that a student receive a certificate per their employment, then this number will grow. Knowing my students, I know that about half of my current completions are due to a company requirement. Another gap that I recognize is the disconnect between salaries in Machine Tool fields. There is a dramatic income difference in the salaries from a Machine Tool Operator to a Machine Layout Worker. Although, these reduced salaries in operator positions could also be a benefit to us, as many of these individuals may come back to school to enhance their skills and work their way up the ladder in their respective occupation.

6. What disproportionate gaps need to be addressed?

The student ethnicity in the Machine Tool Program lacks a presence of the African American community. According to the overall school data, African Americans make up about 4% of the MJC population, and according to my data, I have 0% currently. Knowing my students, I know that some of this is masked in my demographics, but I know African Americans do not make up 4% of this data.

7. What are areas in which the program could improve? (curriculum, scheduling, modality, other?)

I believe that the Manual Machining portion of our program is strong, and does a good job of meeting the skills required of local employers. On the other hand, I believe that our CNC Program is constantly a moving target. We need to continue to adapt and advance with current industry trends in the field, which can be quite expensive. Technology in the area of CNC equipment and tooling continues to expand in CNC Milling, Turning, Waterjet Manufacturing, Laser Technology, and Metrology. Our program needs to ensure that we are, and continue to teach on this high platform. Our current investments in new equipment for Milling, Turning, and Robotics are heading the right direction, but we also need to keep up with advancements in tooling and software to remain cutting edge. Data in

a recent HTEC conference showed that 4 & 5 axis machines were only sold at a rate of 20% to schools vs industry from 2015-2018. This means that schools aren't keeping up with industry trends.

8. Where are there gaps in the program on how students are meeting learning outcomes, skills, or competencies?

The gaps in our program on how students meet their learning outcomes and skills are usually shown on our CNC side of the program. I believe the main reason is due to the lack of equipment and space the lab occupies. Many of the classes will require students to share a machine. Sometimes with as many as 5 or 6 students sharing a machine. Obviously with this many students, not everyone can get as hands on as would be conducive to their learning experience.

External Opportunities

9. Where are potential opportunities for expansion, improvement, or new program development?

I could see our program expanding in many different ways to advance education in our field at the school. Recently I have been working with the Science Department on resurrecting some of the engineering classes. I would love to see a way that we build a pipeline between the engineering and machining courses. My idea would be to have students from the engineering department work directly with students from Machine Tool Department in creating manufactured proto-types. Engineering could design and draw a part, and then work directly with a machinist, one on one, to fabricate said part. This would be a great way for students to simulate a real world communication, design, and testing environment. Our program is also in the infancy stages of robotics. This area will help build a sense of community between ELTEC and MACH students. Students will have yet another career path to choose from.

10. What are some industry or disciplinary trends that could enhance the program?

I was fortunate enough last year to attend the IMTS (International Manufacturing and Technology Show) in Chicago. I was very surprised by the amount 3D printing that was taking place on the new equipment with metal powder. Beyond just 3D printing, I noticed that many Machine Tool Manufacturers were beginning to incorporate metal printing along with CNC machining in a multi-operational machine. This means that a part can be printed and machined in the same Machine Tool, sometimes with dissimilar materials. Lawrence Livermore National Laboratory sits on our Machine Tool Advisory board and has been recommending we advance into this industry trend sooner than later.

External Threats

11. How are changing resources, technology, employer, or transfer requirements affecting the program's ability to serve students?

The economy has been booming for the last 2 years, but with the amount of enrollment that the program has seen this fall, it may be slowing down some. Industry has been evolving over the last few years and jobs that used to be for a CNC operator are now being replaced in some instances by robots. The main reason for this change is that industry hasn't been able to find a quality entry level hire. On a recent visit to Fanuc Robotics and APT Solutions, I saw robots working with Machinist 1st hand. New robots are collaborative and allow an operator to work right next to a robot in motion. Contrary to popular belief the employees weren't bitter about the robot taking their job, but excited for it, because the robots were set up to take on the monotonous tasks that the operators didn't want to have to burden themselves with. These operators were then up trained and used their skills towards more value adding tasks.

12. What are some current industry or disciplinary trends that could have a negative impact on the program?

I think the most common trend in the world that affects our program is exposure. Students are not exposed to anything in manufacturing and our field tends to get a bad reputation. The days of running one machine and making a million parts are gone. Today's technology advancements can put you in a manufacturing career, where you may not even get your hands dirty. It seems that no one that is fresh out of high school knows where anything that they have actually came from. By taking some basic classes students can learn skills from our trade, process techniques, and adapt them to their everyday life as problem solving skills. Our problem is getting students to our door.

13. What other obstacles does the program face?

The last problem that our program faces is space. Our Machine Shop is at maximum capacity. Last spring in order to get one machine in, I had to move eight others to make space with a complete new floor configuration. As we continue to grow, the lack of space is something that the program will need to address.

Goal Setting and Activities

Goals

Program Goal	Mission Alignment	Area of Focus
Increase the number of completions in the Program overall.	Programs / Services based on Scholarship of Teaching and Learning	Program Design
Grow the number of students enrolling in introductory Machine Tool classes.	Workforce Needs	Student Support
Continue to evolve with technology closely, mirroring industry partner needs.	Workforce Needs	Curriculum

Activities

Activities	In Support of Goal #	Outcome or Deliverable
<p>'- Update the program to clean up Skills Recognitions and Certificates to add more completers to the Program as a whole. Basic Machining Certificate- Entry Level Machinist Maintenance Machinist Certificate- Maintenance Employee focusing on Manual Machining CNC Machinist Certificate- Production Machinist focusing on CNC Machining Machine Tool Technology Certificate- Well-rounded machinist that has acquired both manual and CNC skills Machine Tool Technology AS Degree- Well- rounded machinist that has acquired both manual and CNC skills with a transfer focus</p>	Goal #1	<p>Students can start their path in machining with a Certificate in Basic Machining, which will give them skills for an entry level operator position. From there, students will have 2 major certificates to follow (CNC Machinist/Maintenance Machinist) based upon their specific work environment, or preferred area of employment. From their they can still continue on to achieve the Machine Tool Certificate, or continue AS Degree.</p>
<p>Actively participate in High School recruiting events on and off campus. Specifically setting up a booth at the Apprenticeship Expo in the Fall, with current students, and offering tours of the Machine Shop for other events with enrolled students talking about different opportunities and experiences that they have had in the trade.</p>	Goal #2	<p>These activities should help gain exposure for students in an industry that isnt promoted much. This can also be an area that helps target disproportionately challenged students.</p>
<p>Add additional courses to support Robotic Programming and Operation, as used in the Machine Tool Trade, and other trades.</p>	Goal #3	<p>This activity will help the program continue to advance in technology used in industries around us.</p>
<p>Update the building interior and exterior with marketing to advertise equipment, software, and industry training offered on campus. Transform the image, and possibly even the title of the</p>	Goal #2	<p>This will help transform the image of the Machine Tool Programs technological advancements.</p>

Program as a whole to promote Advanced Manufacturing.

Open the shop up to engineering focused students to either work hands on with equipment, or partner with our students to turn designs into functional mechanical parts.

Goal #2 This activity will be another draw to our program enrollment.

Resource Requests

Category	Request	Activity #	Estimated Cost
Prof. Devel.	Continue to take classes on Robotics and attend conferences focused on Machining.	3	8000
Prof. Devel.	Invest in some tabletop CNC Machines to get more students hands on at trainings and events	2	50000
Prof. Devel.	Continue to grow in Metrology and advance the program into 3D Printing Technologies. (Additive Manufacturing)	2	80000
Equipment	Invest in some tabletop CNC Machines to get more students hands on at trainings and events	2	50000
Technology	Continue to grow in Metrology and advance the program into 3D Printing Technologies. (Additive Manufacturing)	5	80000
Personnel	Eventually hiring another instructor to help teach Manual Machining Classes	3	40000
Facilities	Acquire some more space to allow the Machine Shop somewhere to grow. Currently there isnt enough space to add any more equipment. Marketing Banners and Facelift for the current shop	4	500000