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Department Chairs/Program Leads: Please press the edit symbol in the right-hand corner to update. Below, the text in bold corresponds both to the name of the box when editing this page and also to the first-column on the APRU worksheet. If you have questions, please contact: papemary@fhda.edu.



 Dept - (B/CS) Design & Manufacturing Technologies



Program Mission Statement: Mission

The Design and Manufacturing Technologies Department offers broad yet in-depth curriculum that imparts a strong foundation for direct employment and engagement in local industries or transfer to a four-year college. Diversification is the hallmark of the program. The program outcomes are based on skills required to gain or enhance employment by means of program innovation, which focus on critical thinking, peer communication and personal responsibility for career success.

Program Description

The Design and Manufacturing Technologies, which is a combination of Manufacturing / CNC Technology (MCNC) and CAD Digital Imaging (CDI) program (Fall 2016) offers state-of-the art advanced manufacturing instruction in computer aided design (CAD), reverse engineering (scanners), 3D printing, laser systems, computer numerical control (CNC) machining, model making/rapid prototyping and materials processing. The curriculum is ideally suited to those who are new to the field, as well as drafters, lab technicians, conventional machinists and machine operators who wish to update their skills and advance in this rapidly changing industry. Certificate of Achievements in CAD-Mechanical and CNC Machinist are the initial point of entry into the Design and Manufacturing program. Students who complete the program will have a solid foundation in design and manufacturing systems with the opportunity to choose a further specialization in the areas of CAD design, advanced CNC set-up, CNC operation, CNC programming, metrology and inspection.

The program is also a primary choice for many Silicon Valley engineers, designers, planners and purchasers who wish increase their "hands on" skills and overall knowledge of the design and manufacturing process in order to advance their careers.

Examples of career possibilities include: CAD drafters, Computer Numerical Control Machinist, Product Model Maker, Computer Numerical Control Programmer, CNC/Research & Development Machinist, Inspection and QA (new program starting in Fall 2017) Manufacturing / Engineering and Industrial Engineering Technician.

DeAnza College's Design and Manufacturing Technologies program offers state-of-the-art classroom and lab facilities. Students have the opportunity to work with CAD/CAM workstations, 3D printers, Laser Systems, CNC lathes with live tooling, CNC vertical machining centers with 4th and 5h axis capabilities, as well as a 4 axis horizontal machining center. The students also have access to automated coordinate measuring machines, inspection



equipment, conventional machining equipment and three CAD/CAM programming labs. Design and Manufacturing Technologies offers an accelerated day program, designed for those who need to reenter the workforce quickly. Courses are also offered in the evening to accommodate incumbent workers. The program is also approved by the California Department of Apprenticeship Standards, which currently teaches apprenticeship classes for the International Association of Machinists and Aerospace Workers and the California Tooling & Machining Apprenticeship, with current programs at Northrup Grumman and FM Industries, as well as internships at Lockheed Martin and NASA. The DeAnza DMT program also has the distinguished honor of being one of three community colleges in the state that is a NIMS (National Institute for Metalworking Skills) certified facility. The department chair is also a member of the California Manufacturing and Product Development Advisory Committee for the California department of Education and a board member of the NTMA SF chapter (National Tooling and Machining Association). DeAnza will officially become the "Gene Haas Center for Design and Manufacturing" in the Fall of 2017. The Gene Haas Foundation has donated 1 million dollars to upgrade the CNC labs to ensure the program is teaching cutting edge CNC technology well into the future. To enhance this advanced technology, Siemens Corporation continues to grant 100 NX CAM software seats, valued at \$59,000 per seat, as well as other software. The DMT department is the west coast training center for Siemens CNC controls.

DeAnza college is entering the third year of its partnership with HAAS Automation (1 Billion in annual sales of CNC machines) to provide teacher CNC training, which teaches High School and College instructors in the western states how to better utilize their CNC equipment. Haas recently (Winter 2017) entrusted a UMC750SS five axis vertical mill and donated five training simulators valued at \$250,000. The equipment is not only used to teach instructors throughout the US, it is used by our students in daily advanced CNC courses.

The main strengths of the DMT program are our close ties to industry, as well as ties to high school and four-year college programs. Major companies such as TESLA, NASA, Northrup Grumman, Loral Space Systems, Lockheed Martin, Google, Apple Inc. as well as local manufacturing facilities are closely involved in our advisory committee. These companies depend on the DMT program to enhance the skills of their existing and future employees in high tech manufacturing. The program also has articulating agreements with the Silicon Valley Career Technical Education Center and the Industrial Technology program at San Jose State.

I.A.1 What is the Primary Focus of Your Program?: Career/Technical

I.A.2 Choose a Secondary Focus of Your Program?: Transfer

I.B.1 Number Certificates of Achievement Awarded: 47

I.B.2 Number Certif of Achievement-Advanced Awarded: 3

I.B.3 #ADTs (Associate Degrees for Transfer) Awarded:

I.B.4 # AA and/or AS Degrees Awarded: 14

I.C.1. CTE Programs: Impact of External Trends: Employment opportunities for Design and Manufacturing program graduates exist in large manufacturing facilities and small, independent design shops. Individuals with a background in manufacturing technology can also parlay their skills into other related positions in the industry: CAD design, Engineering, CAD/CAM programmers, CNC set-up operation, PLC programmers, and Rapid Prototyping.



According to the California Employment Development Department's Labor Market Information data for the San Jose-Sunnyvale-Santa Clara MSA, there are projected to be 131 combined annual openings for the period 2006-2016 for individuals with this set of skills. The strongest demand will be for machinists with 57 annual openings and a steady growth rate of 6.1%. There will also be demand for computer-controlled machine tool operators with 45 annual openings and growth rate of 18.5%. There will be a limited demand for tool and die makers with only 2 annual openings. 2017 numbers for employment are projected higher in the bay area due to an extreme demand in high tech equipment, automotive parts and medical devices manufactured in local industry.

While the above is a sampling of the CNC career opportunities available, the DMT program serves a variety of other careers. Over the years the program has provided Mechanical Engineers, Industrial Engineers, Program Managers, Manufacturing Planners and Purchasers with career advancing knowledge and skills. These jobs represent a significant number of current career positions, as well as job growth in the Bay Area.

Advanced curriculum in multi-axis, live tooling automation and advanced 3D printing is being developed with SWP and Regional funds. The addition of curriculum and equipment, which is being developed and scheduled to be completed April 2017 and continued into 2018 will increase enrollment.

Ex.1 Added first 3D class in Fall 2016 / Class size 30 -Census enrollment 42 / Advanced 3D class curriculum to be completed this year

Ex.2 Recent Craigslist add for Spring 2017 / 40 respondents in first four days - 29 respondents asked if we had classes in multi / axis-live tooling - Classes being developed with SWP and Regional funding.

In addition to the San Jose-Sunnyvale-Santa Clara MSA, the Design and Manufacturing program provides training to many other areas. DeAnza offers the only Design and CNC program in the surrounding counties. As of 2017 DeAnza serves a vast area, such as Monterey, San Benito, Santa Cruz, San Mateo and San Francisco Counties where no existing Design and CNC programs exist.

I.C.2 CTE Programs: Advisory Board Input: Developing an advanced manufacturing program to advance new and incumbent workers: As a recommendation of our advisory group, the DMT department continues to add advanced manufacturing equipment and curriculum with the help of our industry partners. With the addition of the \$1 million dollar donation from the Gene Haas Foundation and the continuous support of HAAS Automation, Educational Partnership, Gosiger Inc. (Okuma and Hardinge) and Siemens Corp., the DMT department is one of the most advanced manufacturing programs at a community college in the country. With continued support from companies such as SolidWorks, PTC, Autodesk, Sandvick Coromat, Mastercam and Blasercut, the college continues to train at a high level using advanced manufacturing equipment, such as touch probes, carbide tools, high speed machining, advanced cad-cam software, coolants, advanced CAD software, 3D printers and scanners. As recommended and supported by our advisory and the State of California, the DMT program has been awarded \$86,000 from CTE enhancement funds (Spring 2016) to develop a QA/Inspection certificate. This Certificate of Achievement (projected start Fall 2017) will create another untapped employment avenue for DMT students. With the advancement of technology, the DMT department will supply the labor market with higher skilled employees capable of very successful careers in advanced manufacturing. The advisory continues to applaud the addition of advanced manufacturing equipment with ongoing funds supported by



SWP and the Regional Workforce program.

I.D.1 Academic Services & Learning Resources: #Faculty served:

I.D.2 Academic Services & Learning Resources: #Students served:

I.D.3 Academic Services & Learning Resources: #Staff Served:

I.E.1 Full time faculty (FTEF): 7

I.E.2 #Student Employees:

I.E.3 % Full-time : Unreplaced CAD instructor in 2014 and an unexpected CNC instructor leaving in 2015 the amount of part time instruction has increased 116% !!! 15-16 FT32% PT/Ov 68%

I.E.4 #Staff Employees: 2

I.E.5 Changes in Employees/Resources: N/A

II.A Enrollment Trends: Incomplete data for DMT program. Combined data available for DMT 2015-16 only. Below is information for MCNC and CAD combined for last two years only. Since the two department merge the most stable and accurate data is 2014-15 and 2015-2016.

The last two years have been stable as the 5 year reconstruction (currently year 2) of the DMT program began. Enrollment has been stable with a slight decrease of 4% (14-15 1632 enrolled 15-16 1577 enrolled) due to a strong economy. Some students have left the program early because of the amount of job opportunities. Many of these students need to provide for their families or send money home to their families in other countries. Unfortunately, some of these students don't get to complete all their courses, but get enough education to get a good paying job. The major change was from three years ago when the program was reevaluated with a decision to rebuild from the bottom up. Starting Fall 2016, eight new courses in 3d printing, advanced SolidWorks, advanced Creo, and other desperately needed design software programs are in the process of being added, both in class and on line. The three Inspection and QA certificate classes will start being offered in Fall 2017. With the addition of these classes enrollment should increase at a steady pace in the future.

Due to a long standing open CNC / Machining faculty position (which was filled in Fall 2016), the department has been forced to schedule courses based on part time availability and part time load issues. This has caused some courses needed to complete the program to be offered at the same time, causing the student to choose one over the other rather than taking two or three courses during a single quarter. This issue alone could possibly make up the 4% difference from 14-15 / 15-16

II.B.1 Overall Success Rate: Data for DMT program for 2014-15 / 2015-16 . Below is combined information for MCNC and CAD for last two years. Program data combined in Fall 2016.

Success rate holds steady at 80% , decreasing 1%

To increase successes rates the department has increased student tutors / mentors and added more available "hands-on" labs and special project assignments throughout the quarter. The



extra time has been generously donated by instructors without receiving pay

The department is currently completing SLOAC assessments for beginning to advanced classes to increase success at the introductory level. As we complete second round of assessments, changes will be implemented to help a higher percentage of students complete the program certificates and degrees.

Extra emphasis will be placed on introductory and on line courses that have a tendency to have lower success rates.

II.B.2 Plan if Success Rate of Program is Below 60%: N/A

II.C Changes Imposed by Internal/External Regulations: The MCNC and CDI department merged in Fall 2016. Due to the merge, accurate reports of the program will not be available for two years. The merge has had a positive affect as many of the skills cross over. The five year plan (currently year 3) is scheduled to increase enrollment over the next three years. This decision was recommended by our advisory committees.

There have not been any direct regulations that have impacted our department.

III.A Growth and Decline of Targeted Student Populations: Data for DMT program. Below is information for MCNC and CAD programs for the last two, which have been combined in Fall 2016.

The program success rate has increased 1% percent (72%-73%) over the last two years (5 % decrease over the last 3 years due to elimination of 7 off campus courses per year in 2013-14 that worked with at risk youths, due to admissions and enrollment regulations. Many of these students represented our targeted population) The last two represent the most accurate data of the department.

Enrollment has also increased 1% over the last two years Although the number is modest, the department continues to it quest to reach out to students who are in need of our services available at DeAnza to gain employment skills to provide for their themselves and many times thier families.

III.B Closing the Student Equity Gap: The progress and ongoing progress, which has had minor changes over the last APRU reports, is due to availability of educational tools at little or no cost to the college.

The DMT faculty will continue with the existing plan of actively providing counseling on course selection and scheduling to students, as well as increased exposure of the DeAnza Design and Manufacturing program. Expanding our lab times and increasing the amount of tutors/mentors and open lab time for those students who do not have computer access.

Free home version software, Mastercam, SolidWorks, NX and Autodesk Inventor, and learning tutorials such as Solid Professor have also been added for those with internet access. For those without access, the software can be used in the expanded lab hours. Free SolidWorks associate and professional certifications are offered free at DeAnza CAD lab



NIMS (National Institute for Metalworking Skills) skills / project certificate tests are are now available at no charge to the students. These certificates are part of a national accredited training program that is provided by the DMT department, which is a accredited training program. The cost is covered with lottery funds.

III.C Plan if Success Rate of Targeted Group(s) is Below 60%: The program is over 70%

III.D Departmental Equity Planning and Progress: Continued speaking engagements at career days at Mt, Pleasant H.S. and Alta Vista continuation H.S., as well as an articulation program with the Silicon Valley Career Technical Education Center, has opened up more career opportunities to underrepresented populations, which will help the department attain our goal of lowering the equity gap.

Continued efforts in making software and on line educational tools no charge and and available away from the college is allowing all students the same access. The percentage is modestly going up at 1% last year, but if we can achieve 1% growth and success per year we are moving in a positive direction.

IV.A Cycle 2 PLOAC Summary (since June 30, 2014): 100% complete CDI PLOACS that were migrated over to DMT. MCNC PLOACS have not been migrated over to DMT...MCNC PLOACS will be migrated Spring 2017 and program data will entered in system. 40% of data is complete awaiting migration.

IV.B Cycle 2 SLOAC Summary (since June 30, 2014): 43% courses completed... Ad Hoc report innacurate on line because labs are counted, which do not require assessment. Currently fixing data as all SLOAC PLOAC is being migrated to DMT page in Trac Dat.

V.A Budget Trends: Planning, implementation and assessment are major parts of training highly skilled students for the current workforce. When lack of funds becomes an issue within the program, one or more of the areas will be affected. The result would be students finishing the program without the necessary skills to compete for high wage employment. Fortunately, there have been and continue to be generous external donations and consignments, which have allowed the department to implement "hands on" training and assess students' needs to become extremely desirable employees. Unfortunately, the budget has been the same for the last five years and is lower than it was six years ago. With increased funds the donated and entrusted equipment can be used to its full potential. Addition of SWP and Regional Workforce funds will help tremendously as we move forward

V.B Funding Impact on Enrollment Trends: The current college funding over the past three years ("B" and CTE) has allowed the program to keep up with its current demand of enrollment, but at the same time limiting growth in other advance manufacturing areas.

With a HAAS \$1million dollar external donation and ongoing SWP and Regional Workforce funds, the DMT program will be able to better serve students in advanced manufacturing. These additional funds will allow the program to serve a new population of manufacturing students in the future, adding new enrollment in advanced technology courses. In a recent department survey over 50% of the students who received certificates would come back and take new advanced CNC classes. Incumbent workers, who never took introductory courses at DeAnza also have expressed interest in advanced manufacturing courses.

V.C.1 Faculty Position(s) Needed: Replace due to vacancy



V.C.2 Justification for Faculty Position(s): Faculty justifications based on advisory meetings:

CAD / Replacement – Loral Space Systems, Lockheed Martin, Northrup Grumman, Google among others noted that in order to better serve the community with high paying jobs, the new advanced CAD courses need the support of another qualified full time faculty. With the retirement of Gary Lamit and the CAD program down to one full time instructor, the program needs a committed full time instructor to develop curriculum, both on-line and in class, to align with the rapidly changing needs of industry and the future employment of DeAnza students.

V.D.1 Staff Position(s) Needed: None needed unless vacancy

V.D.2 Justification for Staff Position(s): N/A

V.E.1 Equipment Requests: Over \$1,000

V.E.2 Equipment Title, Description, and Quantity: Two Lathes HAAS CNC machines with live tooling and Y axis capabilities (instructional equipment). New machines / 2 year warranties included / Life expectancy 10 years / Item does not require change in infrastructure

One HAAS continuous Five Axis CNC machine (instructional equipment). New machine / 2 year warranties included / Life expectancy 10 years / Item does not require change in infrastructure

One HAAS high speed high production 4th axis mill (instructional equipment). New machine / 2 year warranties included / Life expectancy 10 years / Item does not require change in infrastructure

Three 14" Engine Lathes (instructional equipment). Replace current Lathes that are now over 35 years old. / 1 year warranty included / Life expectancy 20 years / Item does not require change in infrastructure

Three vertical Bridgeport milling machines (instructional equipment). Replace 25 yr old machines / 2 year warranties included / Life expectancy 20 years / Item does not require change in infrastructure

One surface grinder (instructional equipment) Replace 20 yr old machine / 1 year warranties included / Life expectancy 20 years / Item does not require change in infrastructure

EQUIPMENT DOES NOT REQUIRE NEW INFRASTRUCTURE



SOFTWARE FOR EXISTING PROGRAM (ANNUAL PURCHASE/PAID WITH LOTTERY FUNDS IN THE PAST)

Mastecam annual update
 NIMS National Certification annual
 Vericut Simulation annual update
 SilidWorks CAD annual update
 NX (both cad and cam) annual update

After the initial SLO assessment process, it was determined outcomes were based differently for skills in classes based on the equipment the student was using. Assessments vary on equipment that is not up to date and in need of constant repairs. New equipment will allow the department to include more advanced assessments.

The correct use of software is the SLO/PLO assessment method in CAD/CAM classes

V.E.3 Equipment Justification: The advisory committee annually asses the existing equipment in the DMT lab.

The equipment, which is used by students in the program and used in 90% of our classes, must meet both outside standards and not exceed life expectancy (annual wear for long periods of time)

Information gathered from our bi annual advisory meetings determined that some of the basic skills equipment needed replacement in order for student success. In order for the student to be successful, the student must be able to test their skills against equipment that is working within the manufactures tolerance. If not, the student is not sure if they need to improve or equipment failure. This can lead to false student learning assesments Currently 10 mills and lathes have reached their life expectancy (20 years).

The advisory also recommended replacing and adding new CNC Vertical Mills and CNC Y axis Live Tooling Lathes. The two mills are closing in on their 10-15 year life cycle and CNC Lathes are to expand into other areas where students can expand their skills, which leads to more job opportunities and higher wages.

Adding this equipment aligns with our college and department commitment to innovation, equity and critical thinking. Without resources to help the community succeed would make our mission statement and strategic goals just words.

V.F.1 Facility Request: At this time the DMT facility has been approved and the architectural plans have been submitted to the state for a partial renovation by means of a \$1 million dollar donation by the Gene Haas Foundation. The current E23 computer lab will be reconstructed as a machine tool lab and the E25 "chalkboard room" will become the computer lab.

All items needed should not be what is considered "normally included in a similar facility" Equipment to complete the advanced manufacturing lab will be supported with SWP and Regional Workforce funds

V.F.2 Facility Justification: • The DMT Advisory Board supports this donation wholeheartedly. Many of the corporations on the advisory board have offered to donate smaller values of tooling, fixtures, coolants etc. when the facility is finished.

• New and existing students will use this new innovative lab to increase their job opportunities



and increase their salary. (job security and higher wages promote physical/mental wellness and personal responsibility)

- The current facility was remodeled in 2004 and has life expectancy of many years.

Unfortunately there was little vision with the past leaders of the department as to what the future of manufacturing would look like. Therefore the facility has its deficiencies.

V.G Equity Planning and Support: At this time the DMT department has determined a need for continued funding for software and on line training tools, which has been supplemented with lottery funds. As we move forward and develop more strategies such as our work centered around success centers and other small group individual learning environments, funds would be required for ongoing support and future development. Cost to sustain these programs would be evaluated as we move forward.

V.H.1 Other Needed Resources: Continued college funds to support tutors/mentors and a CTE counselor who is well versed in DMT courses and assigned to the DMT program. Student teachers to support success centers, extended lab hours and other individual/small group learning environments. Many of our positive assessments have pointed directly to access to tutors. The needed changes have pointed the lack of a designated counselor for incoming DMT students who they can seek out for advice when entering the program.

V.H.2 Other Needed Resources Justification: The data that supports the need would be growth and success rates of students, especially our targeted population.

V.J. "B" Budget Augmentation: The DMT department has developed a Certificate of Achievement in Quality Control and Inspection. The program will start Fall of 2017.

The small amount of additional funds would be used to support the innovative QA/QC lab annually and support annual wear and tear on the hand held metrology equipment

The impact on the program will result in higher enrollment and job skills, which produce higher salary results.

The amount to add to the existing "B" budget would be \$3000.00 annually.

At this time SLOs are established and SLO / PLO assessments will be completed when the new courses start in 2017-18

CTE Advisory Boards throughout the bay area have had input in the curriculum, lab measuring equipment and other items needed to create the QA/QC Certificate of Achievement, which was co-developed thru regional work with four community colleges in the north, east and south bays.

Due to the hard work of the department, the DMT department is the only college of the four to complete and offer a certificate in 2017-18.

V.K.1 Staff Development Needs: All instructors in the DMT department use staff development funds annually. These funds allow us to innovate specific assessment options. It may not be a specific assessment that leads us in this direction, but how we can we improve assessments to align the student's needs to gain employment.

V.K.2 Staff Development Needs Justification: After looking over SLO assessments from the



department, it has become apparent that some instructors need development in order to prepare assessments that align with the current need of the student. This will ensure we are providing the training to prepare students for employment.

Our advisory group also reminds us that if we don't continue to develop our skills we cannot help them maintain a steady flow of students who will lead their companies in the future.

V.L Closing the Loop: Over the last several years the assessments were established by the resources received. Naturally we are able to asses at a higher level as resources became available in the past five years. Evaluating assessments and outcomes will change dramatically over the next five years. When you add resources you add outcomes and assessments methods that were not possible in the past. Students can be assessed on more advanced curriculum and equipment. The assessments can be "hands on" like they would experience in the workplace. The cycle will forever improve as these resources allow you to take your program to higher levels. The results are based on the increased amount of students who are currently working and the increase in salaries in this strong economy.

Submitted by: Mike Appio appiomike@deanza.edu x8283

Last Updated: 03/24/2017

APRU Complete for 2016-17: Yes

#SLO STATEMENTS Archived from ECMS: