Ferris State University

Manufacturing Technology

Academic Program Review

June 1, 2011

Program Review Panel

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Section 1

Program Overview

A. Program Goals

During the past six years, the MFGT program faculty have taken a very pro-active approach to further developing the program. Beginning in the fall of 2005, as program faculty were reviewing the previous Academic Program Review document, the need for a more thorough approach to planning was identified. Meetings were held regularly to discuss the long-term development of the program and by the end of the school year program faculty had redefined the program's mission, created a vision of the future, and identified a set of core values.

With the guiding principles in place, faculty progressed to developing and implementing a series of strategic development plans and subsequent development reports. Since implementing the first of these plans in the spring of 2006, all major program decisions have been directly tied to fulfilling the goals and objectives of these plans.

Please see Appendix A, Attachment A-1, Strategic Development Plan. The document is formatted in such a way that it addresses the questions of this section. Items highlighted in blue are those in which significant progress has been made.

The current plan was originally developed in the fall of 2006 and implemented soon after. Due to the amount of work and time required to make reasonable progress, program faculty chose to carry over the plan for the past few years. Having now made significant progress, the plan will be reviewed and updated during the next several months.

B. Program Visibility and Distinctiveness

1. Unique Features/Components of the Program

The following list of highlights includes factual statements currently used to gain visibility and identify the uniqueness of the program.

<u>Unique, Diverse, Project-Based Experience</u>

This program is the only university-based associate degree in the nation offering a comprehensive education in tooling technology. The curriculum covers multiple tooling categories including jigs and fixtures, metal forming dies, and plastic molds. All major tooling courses are project-based and require the application of CNC machining technology in producing real-world, functional tools.

Articulation Options

Students entering this program from a secondary school with an official articulation agreement may have multiple opportunities to receive college credit for their secondary technical education experience.

Concentration Options

This degree provides students the option of concentrating on either "tooling technology" or "processing technology." Both concentrations share a common core with the difference being the nature of advanced technical courses.

The tooling technology concentration focuses on learning to apply the science and methodology of precision machining to tooling applications. Students gain experience in project management, tool design, costing estimating, and the production of major tool assemblies as well as tool tryout and troubleshooting.

The processing technology concentration focuses on learning to apply other (non-machining) manufacturing technologies such as welding, molding, programming automation controls, etc. This concentration allows students to select technical courses from a variety of options based on their interests.

Communicating with Industry Standard Process Documentation

Throughout the program students further develop communication skills by creating and utilizing industry standard process documentation including: flow charts, gantt charts, process sheets, operation sheets, setup sheets, inspection reports, and standard operating procedures.

Application of World-Class CAD/CAM Technology

Beginning in the first semester, students apply world-class CAD/CAM software to create 3-D solid models and component drawings. Throughout the remaining semesters, these skills are further developed through the design and toolpathing of complete tool assemblies. Second year tooling projects rely exclusively on the application of CAM generated toolpaths and focus on producing accurate, efficient programs.

Direct Entry to Numerous Bachelor Degree Programs

Both concentrations result in direct entry to eight bachelor degree programs including the following:

College of Engineering Technology:

- Manufacturing Engineering Technology (MFGE)
- Quality Engineering Technology (QET)
- Product Design Engineering Technology (PDET)
- Mechanical Engineering Technology (MET)
- Plastics Engineering Technology (PLTE)
- Rubber Engineering Technology (RUBE)

College of Business:

- Business Administration with Professional Tracks (BAPT)

College of Education and Human Services:

- Technical Education (TCED)

Support from Industry Leading Companies

This program is supported by numerous industry-leading companies who have pledged their support through scholarships, tooling and equipment donations, consignments, and industrial projects.

2. Programs Ability to Attract Quality Students

The MFGT program is currently in a better position to attract quality students than ever before. The program can now boast a completely updated dynamic curriculum with multiple articulation options, application of the latest CAD/CAM technology, and a direct path to multiple bachelor's degree programs.

These factors, along with higher enrollment standards, have clearly had a positive impact on attracting quality students.

3. Competition for Prospective Students

Although the program is very unique and without any direct competition in the area of tooling applications, prospective students interested in pursuing a manufacturing associates as either a terminal degree or a stepping stone, are often confused by propaganda from community

colleges promoting manufacturing-related associate degrees with CAD/CAM courses.

In following-up with students who fail to show for summer registration, faculty have learned that the vast majority of these identify the lack of family financial resources as their road block to starting their college careers in the MFGT program.

C. Program Relevance

1. Labor Market Demand Analysis

   In reviewing labor market data produced by the Federal Department of Labor for careers associated with completing the MFGT program as a terminal degree, the current growth projection is flat to slightly declining here in the states due to globalization. Even though growth may decline slightly, the demand for these workers will remain high as the majority of current workers are nearing retirement and significantly fewer young people have pursued these careers over the past 15 years. Many companies are reporting difficulties finding qualified workers which presents significant concerns due to the fact that these workers are those primarily responsible for maintaining and advancing the automated manufacturing technology. Please see Appendix B, Career and Labor Market Reports, for detailed information on the three primary careers associated with the completing the MFGT program as a terminal degree.

   In reviewing labor market data produced by the Federal Department of Labor for careers associated with completing the MFGT program as a stepping stone to a career in Manufacturing Engineering, the data is somewhat difficult to interpret as the Department of Labor just recently identified a SOC code for this specific occupation. Closely-related careers show a stable projection for the future.

2. Response to Emerging Technologies, Stakeholder Needs, and Other Issues

   Responding to change is a key component to maintaining the strategic development plan. Although faculty often meet with actively-engaged industrial partners, the program's industrial advisory committee serves a key role in the planning and development process. As noted in the attached strategic development plan, the program uses a system of gathering information from stakeholders, reviewing the information with the assistance of the program's industrial advisory committee, and adjusting the plan accordingly.

3. Student's Rationale for Enrolling in MFGT

   According to recent surveys, over 90 percent of the program's incoming freshmen are focused on completing a bachelor's degree in technology with the majority of these directing their attention on the Manufacturing Engineering Technology program. The majority of incoming freshmen see the MFGT program as a stepping stone and technical base for advancing their education.

D. Program Value

1. Benefit to the University

   Program faculty have a diverse education and experience base providing support for the MFGE program with the majority of MFGT faculty teaching approximately half their annual load in MFGE courses. Program faculty are also capable and qualified to teach related topics in other technology-based programs--particularly those dealing with process documentation, technical writing, and Computer Aided Design (CAD) applications.

   Program faculty are active throughout the college and university as shown by their participation in numerous committees and involvement in university activities.

   The manufacturing lab facilities and equipment are used to support both the MFGT and MFGE programs. In addition to this, they also support related classes for six other programs including: Plastics, Rubber, Welding, CAD Drafting and Tool Design, Product Design, and Mechanical Engineering.

   Lab facilities and equipment have proven to be of great value to many university groups including the Physical Plant, Grounds Crew, Motor Pool, Dining Services, and other academic programs. The manufacturing lab technician estimates that he and his lab attendants (student workers) perform approximately 150 hours of machining-related support work for the university each year. At a basic shop rate of $50 per hour, this equates to $7,500 per year in savings to the university.

2. Benefit to Students

   Each year as junior/senior projects arise, program faculty often serve as consultants to dozens of manufacturing-related (non-majors) working on junior/senior projects.

As a result of student interest in special project teams, program faculty implemented an “open-lab” opportunity to help support these initiatives. Since implementing this opportunity two years ago, several faculty have invested hundreds of non-paid hours working with these students and facilitating the design and build of such projects.

With the implementation of “open labs”, the lab facilities and equipment are now seeing much greater utilization--particularly with special project teams. Special project teams such as the Formula Team, Baja Team, Human-Powered Vehicle Team, and Rube Goldberg Team utilize the manufacturing lab regularly to produce their projects. After two years of offering an “open-lab” opportunity to special project teams and tracking the associated man hours, it has been determined that the lab facility and equipment is now receiving an additional 1,900 man hours of student use each year.

3. Program Personnel Assessment of Value to Employers

   Program faculty are confident that the new curriculum will better-ensure competent graduates who are more prepared to actively engage in higher-level processing applications. It is believed that the recent push toward high-level CAD/CAM software and the corresponding application of automation will prove significant factors in increasing the overall value of MFGT graduates.

4. Benefit to Other Educational Entities

   Faculty serve the greater educational community and industry through educational advisory boards, serving as certification test proctors, guest speakers at manufacturing education events, participating in technology user groups, and participating on regional and state education committees.

   Faculty have also established an initiative to provide secondary instructors, students, and counselors the opportunity to explore the world of manufacturing at the International Manufacturing Technology Exposition (IMTS) in Chicago. This bi-annual event is titled the “Michigan Manufacturing Exploration Trip” and is intended to stimulate secondary student’s interest in the world of manufacturing. The program hopes to secure external funding through related grants and regional manufacturing councils in order to continue expanding this opportunity.

5. Benefit to the Local Community and General Public

   Program faculty are well-engaged in the local community and support a number of community service groups and non-profit agencies.

On several occasions since the last program review, MFGT courses have taken on special development projects for both the community as well as private business These special projects provide students service learning opportunities that bring a great deal of reality to the course projects.

Section 2

Collection of Perceptions

Due to the fact that the MFGT program implemented a new curriculum during the 2009-2010 school year and that the first group of students under this new curriculum have just completed their second year of the program, there is currently no relevant data available for the following groups of stakeholders: Graduates, Employers, and Graduating Students.

A. Graduate Follow-up Survey

New curriculum implemented 2009-2010: Survey not applicable.

B. Employer Follow-up Survey

New curriculum implemented 2009-2010: Survey not applicable.

C. Graduating Student Exit Survey

New curriculum implemented 2009-2010: Survey not applicable.

D. Student Program Evaluation

The student survey instrument consisted of an online survey totaling 53 questions covering 14 categories. Responses were given on a Likert scale where answers were equated to numbers ranging from one to five. Responses were analyzed for mean, mode, standard deviation, and validity.

Student response was 100 percent with all second year students responding.

On the positive side, students strongly agreed with the following items identified by a mean score greater than or equal to 3.50.

- Major courses are conveniently located.
- Career planning information meets your interests.
- Instructional lecture and laboratory facilities are safe.
- Instructional lecture and laboratory facilities are functional.
- Instructional lecture and laboratory facilities are well maintained.

On the other hand, students disagreed with the following items identified by a mean score less than or equal to 2.00.

- Instructional lecture and laboratory facilities include enough workstations for the number of students enrolled.
- Instructional materials are available at a reasonable cost.

The items with the greatest variation in student response include the following:

- Job success information of former student's indicates how many opportunities there are in your occupation.
- Job success information of former student's tells about job advancement opportunities.
- Occupational instructors know the occupational requirements.
- Instructional support services is available to meet your needs.
- Instructional support services is available to meet your interests.

Five student comments were received under the "Additional Comments" section. These include the following:

"Manufacturing lab needs more CNC machinery."

"More CNC machines would be nice."

"Having classes available at more than one time during the semester would help."

"All instructors should be able to utilize the technology."

Please see Appendix C, Stakeholder Surveys and Results, to view a hardcopy of the actual survey instrument and detailed data analysis.

E. Faculty Perceptions

The faculty survey instrument consisted of an online survey totaling 41 questions covering four categories. Responses were given on a Likert scale where answers were equated to numbers ranging from one to five. Responses were analyzed for mean, mode, standard deviation, and validity.

Faculty response was one 100 percent with all five faculty responding.

On the positive side, faculty strongly agreed with the following items identified by a mean score greater than or equal to 3.50.

- Operating processes are relevant to supporting courses.
- Operating processes have provisions for the disadvantaged.
- Operating processes have provisions for the handicapped.
- Operating processes have provisions for program advisement.
- Operating processes have provisions for career planning and guidance.
- Program resources provide for professional development opportunities.
- Program resources include use of clerical support staff.

On the other hand, faculty disagreed with the following items identified by a mean score less than or equal to 2.20.

- Program goals and objectives make use of student follow-up information.
- Operating processes include a student follow-up system.
- Provisions for leadership and coordination.
- Qualifications of administrators and supervisors.
- Qualifications of instructional staff.
- Use of program advisory committee.

The items with the greatest variation in faculty response include the following:

- Use of information on labor market needs.
- Program availability and accessibility.
- Provision for employability information.
- Placement effectiveness for students in program.
- Adequate promotion of this program.

Two faculty comments were received under the "Additional Comments" section. These include the following:

> "During the past three years this program has been completely overhauled in regard to curriculum and the application of CAD/CAM technology. Today we can offer an up-to-date, dynamic Associates Degree which functions as a solid stepping stone to numerous bachelor's degree programs. Over the last year, an incredible amount of time and energy has been spent visiting secondary feeder schools attempting to recruit new students. We have been actively advertising the new curriculum for approximately the past nine months. Currently, we find ourselves in an uncomfortable position as we advertise an up-to-date curriculum and some of the latest CAD/CAD technology yet the lab facility shows poorly as most secondary and community college programs have newer equipment and bright, well-organized facilities. The lab is in desperate need of fresh paint, new light reflectors, and floor finishes as well as some minor utility upgrades and a complete reorganization."

> "In the past two years, the MFGT Program has changed curriculum twice. Faculty have lost touch with what students and industry need."

Please see Appendix C, Stakeholder Surveys and Results, to view a hardcopy of the actual survey instrument and detailed data analysis.

F. Advisory Committee Perceptions

The advisory committee survey instrument consisted of an online survey totaling 27 questions covering six categories. Responses were given on a Likert scale where answers were equated to numbers ranging from one to five. Responses were analyzed for mean, mode, standard deviation, and validity.

Advisory committee response was 38 percent with three of eight committee members responding.

On the positive side, committee members strongly agreed with the following items identified by a mean score greater than or equal to 4.00.

- The quality of the MFGT program.
- Program faculty possess knowledge of current practices.
- Program faculty have good rapport with students.
- Program faculty provide students with appropriate academic advising.
- Program faculty provide students with appropriate advising about career planning/placement.
- MFGT students are well-prepared to enter the workforce.
- MFGT program prepares students to enter industry better than other schools.
- MFGT program grads contribute as much as other grads in their first six months of employment.
- MFGT program provides a foundation for multiple career opportunities.
- There are a number of high-quality internships available to students.
- There are job opportunities available to MFGT program graduates.

On the other hand, committee members disagreed with the following items identified by a mean score less than or equal to 3.00.

- The Ferris State University administration supports the MFGT program.
- The current operating budget is sufficient to meet program needs.
- The number of qualified tenure-track faculty is sufficient to meet program needs.

The items with the greatest variation in committee member response included the following:

- The current operating budget is sufficient to meet program needs.
- The program has sufficient resources allocated for coordination and administration.
- Adequate placement assistance is provided to graduates.

Eleven committee member comments were recorded and are listed below under the category to which they refer.

Qualities You Feel are Lacking in Program Grads

"Nothing. They are prepared for entry level positions."

Strengths of the Program

"Graduates are able to enter the workforce prepared for employment with transferable and workable skills."

"Students are taught the basics through to higher technical skills required in industry."

"The hands-on training students receive in the laboratory."

Areas Needing Improvement

"Better equipment, more space for the lab, and more equipment manufactures willing to spend time and supply equipment on loan or lease."

"Encouraging students to look to eventually going on for the four-year BS degree."

"Make sure there is an understanding of the employer needs as well as the students."

Suggestions That Would Help Better Prepare Future Grads

"Continue to focus on the ever-changing industries that students get hired into."

"Look for continued self-development. Encourage students to pursue additional educational opportunities."

Additional Comments

"I would like to see the faculty use the advisory board more and capitalize on the skills of the members. A yearly meeting is fine, but I believe many members of the board are willing to do more to help the faculty. We are invited in for a yearly meeting, presented with a summary of what's going on, fed lunch, and sent off. It's hard to help the school if we're not informed on the needs of the program. Use your board. If the members don't respond when

asked for help then remove them and find people who will. Don't use us only to fulfill the school's dictate to have a board. Make it a resource. Communicate and ask for help. Be it help with recruiting students or advising on issues concerning the academic or financial needs of the program. The faculty are the experts in teaching, your board can help making their job a little easier by helping with business and other non-academic issues."

"This is a great program that went through a down slide in the early 2000 years, but has rebounded to become a respected program."

Please see Appendix C, Stakeholder Surveys and Results, to view a hardcopy of the actual survey instrument and detailed data analysis.

Program faculty have noted the need to re-evaluate the survey instruments for all stakeholder groups and update survey questions so as to provide more useful data and better support the strategic planning process.

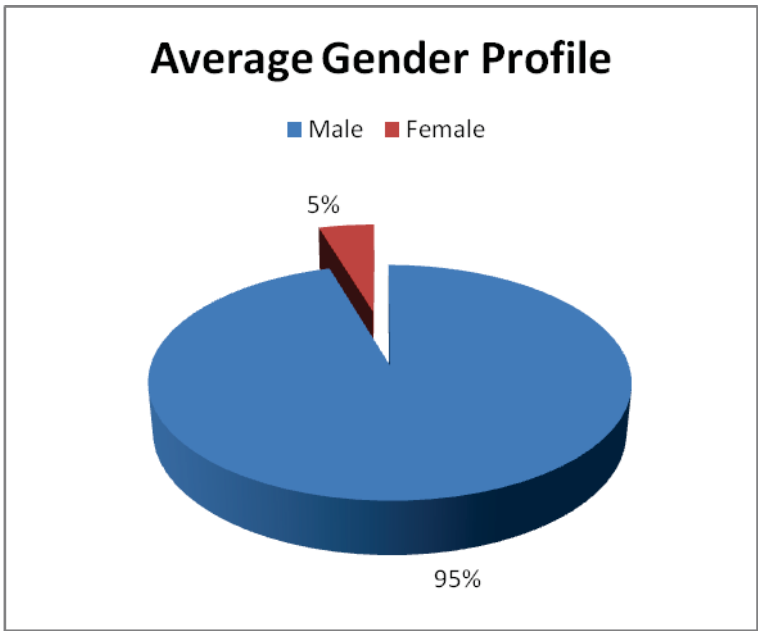
Section 3

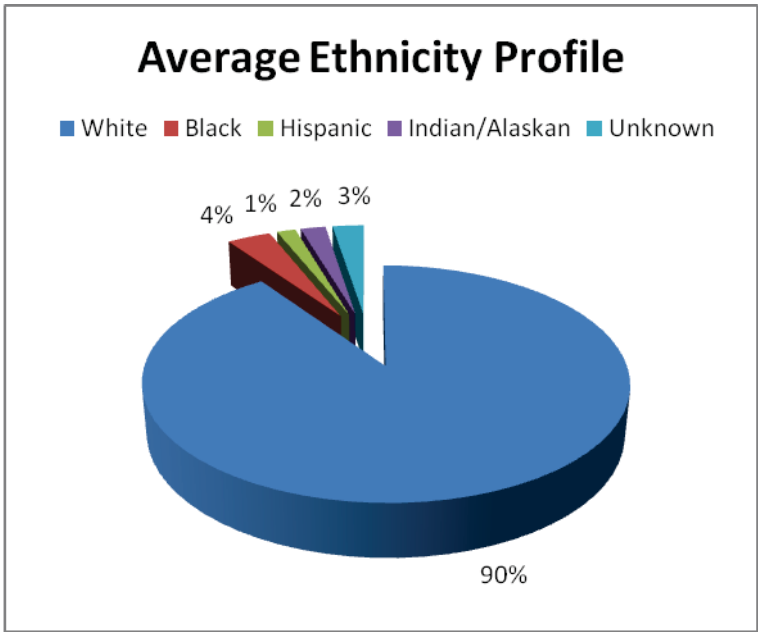
Program Profile

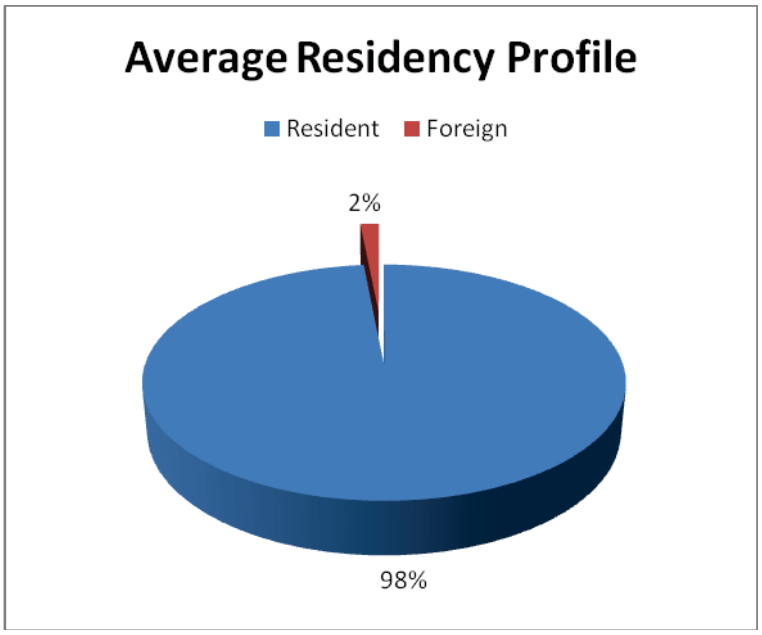
A. Profile of Students

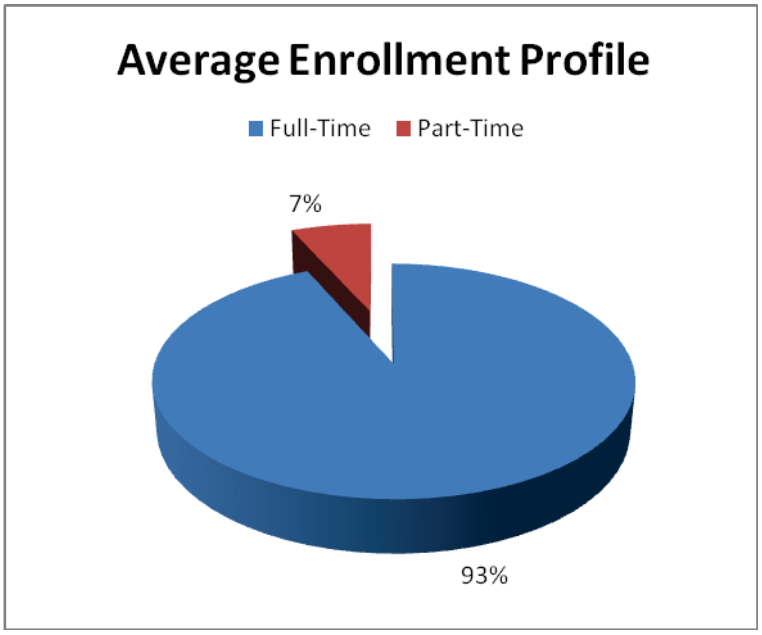
1. Student Demographic Profile

The following series of charts demonstrate the average annual demographic profile of students enrolled in the MFGT programs during the past six years. This data includes Pre-MFGT students.









The average age of students enrolled in MFGT programs is 20 with the vast majority entering the program as traditional students.

Most MFGT courses are sequential in nature and offered only one semester per year. Only service courses such as MFGT-150, a service course for manufacturing related programs, are scheduled more than one semester per year.

Due to intensive lab operations and the close association between lectures and labs, MFGT major courses are traditional in nature and

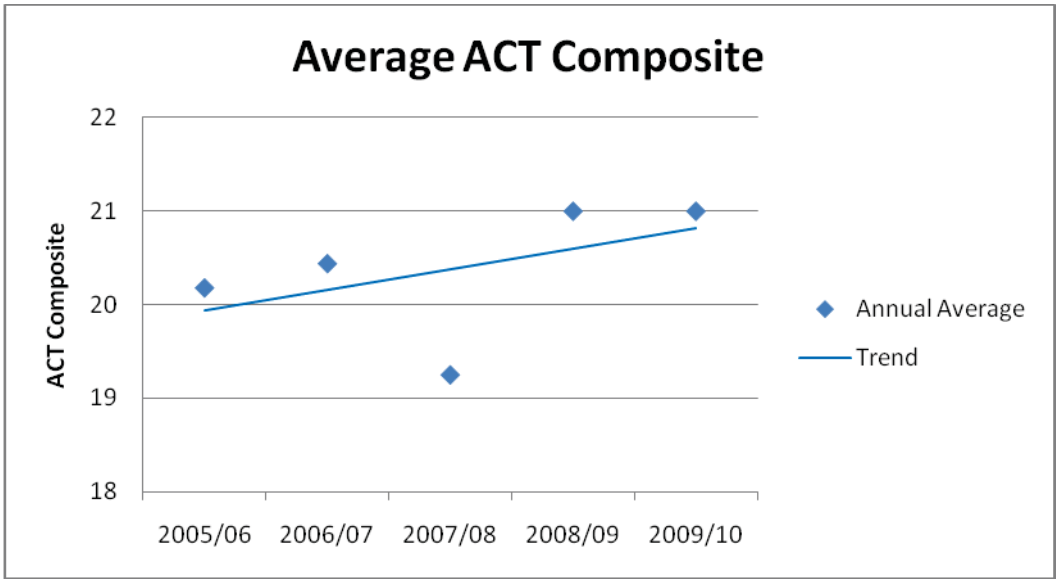
offered exclusively at the main campus in Big Rapids. As a result of recent curriculum actions, opportunities now exist that will allow some MFGT courses to be offered at other locations and through mixed delivery methods. Direct credit opportunities with secondary feeder schools may prove significant in helping seed program enrollment while the less lab-intensive service courses are excellent candidates for on-line or mixed delivery methods.

In order to maintain an effective and efficient system of operation, most MFGT courses are block scheduled throughout the day so that open lab opportunities are available in the evenings.

2. Quality of Students

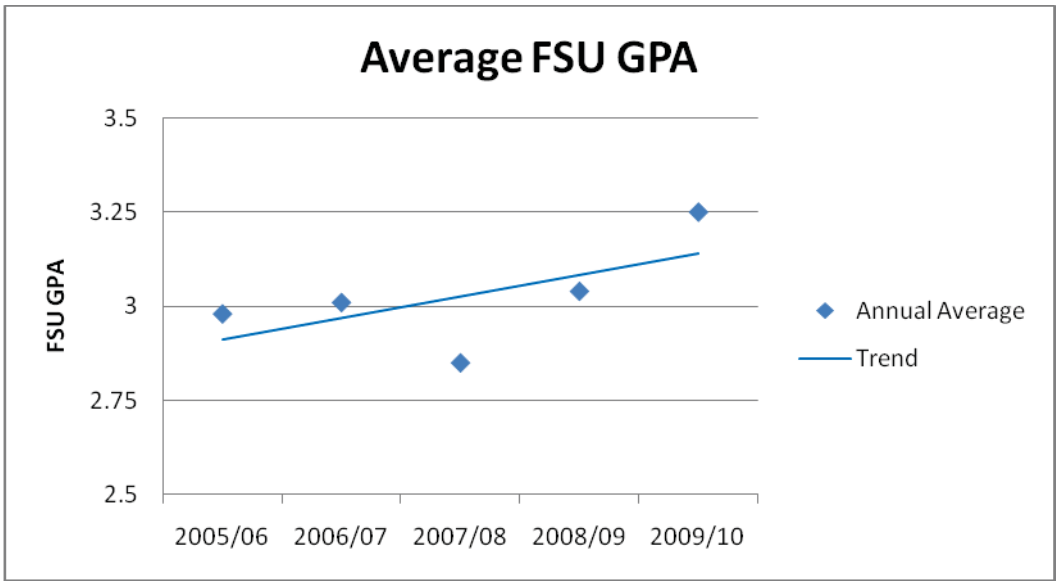
The two primary measures of student quality include the ACT composite score for incoming students and the FSU GPA for existing students.

ACT composite scores for incoming students have increased over the past six years as demonstrated by the graph below.



Two incremental adjustments to the program entrance requirements including both the composite score and math subset score have surely had a positive impact. As program faculty have noticed, having better prepared students results in smoother and faster paced learning allowing the both faculty and students opportunities to go further and push the limits of related technology.

FSU GPA has also shown a positive trend over the past six years as demonstrated in the graph below.



It is believed that several factors play a role in this positive trend. In addition to bringing in better prepared students as demonstrated by the ACT composite scores, other factors such as redefining course prerequisites, and splitting what was historically combined lectures and labs has influenced this trend. Students are now held equally accountable for both technical knowledge as well as the application of that knowledge.

3. Employability of Students

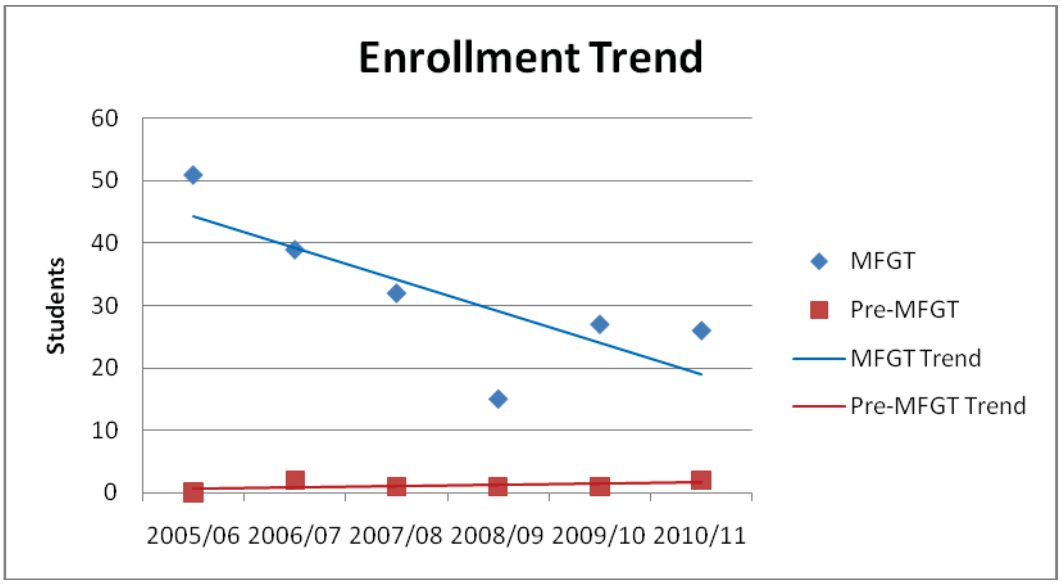
Over the past six years, the number of students who complete the MFGT program as a terminal degree and immediately pursue employment upon graduation has decreased significantly. Unlike the previous two decades when over 80% of those completing the program went directly to work while the remaining 20% continued their education, today the opposite is true. As recent enrollment shows, approximately 85% of students completing the MFGT program now stay and continue their education.

For the few who have left and immediately pursued employment, none have reported issues with finding jobs. It is important to note that even during the recent recession, there's been a greater number of quality job opportunities than there's been program graduates.

B. Enrollment

1. Enrollment Trend and Anticipated Fall Enrollment

Enrollment trend for MFGT majors as well as Pre-MFGT students is summarized in the graph below.



Increasing enrollment has been the single most challenging task for program faculty. Like other manufacturing-related programs around the country, the enrollment trend observed in the MFGT program has been directly influenced by two major national factors and more specific to Michigan, one state factor. These factors include the following:

Negative Press Regarding Global Expansion and Offshore Manufacturing-

Over the past 20 years there has been considerable press coverage regarding free trade, globalization, and the wide-spread push for offshore production. Although there is certainly no question that these factors have had a significant impact on American manufacturing, media reports often overstate the scope and breadth of the impact- leaving the general public in a state of confusion. As a result of this negative press, a considerable number of Americans now believe that American manufacturing is dead, which couldn't be further from the truth. The reality is that the United States is in a process of transitioning from labor intensive, low-skilled jobs to more automated, highly-skilled jobs. It is fact that high-tech markets such as medical, energy, and aerospace are booming in the U.S. and that negative press (particularly that regarding the auto industry) has scared away tens of thousands of smart, technically savvy young people who are now desperately needed in order to ensure that this transition is a success.

America's Great Recession-

Like many career areas such as education, health care, and public service, manufacturing careers tend to run deep in a family's

history- especially here in the Mid-west. Historically this was a positive thing for the MFGT program. Until this past decade, it was common knowledge that with a career in manufacturing (skilled trades in particular) a person was sure to make a good living and all a program needed to do was show people the path. With the recession's significant impact on the auto industry and local jobs, it is more challenging than ever to recruit young people from these families- many of whom have already felt these effects first hand.

Based on the previous three year's follow-up of individuals who were admitted to the MFGT program but failed to enroll for classes, over 70% stated they were forced to attend a community college instead of coming directly to the MFGT program due to recent changes their family's financial situation.

New High School Graduation Requirements (Michigan)-

With the push for higher-level skills and knowledge came Michigan's Merit Curriculum and with it, new high school graduation requirements. Soon after the rollout of these new requirements, Michigan's secondary career technical programs noticed a reasonable decrease in their enrollment due to the fact that many high school students could no longer justify enrolling in these vocational programs as they had additional requirements in core academics to fulfill.

Being that these career technical programs have historically served as the primary feeders to MFGT, it is no surprise that the decreased enrollment at the secondary level has impacted the MFGT program.

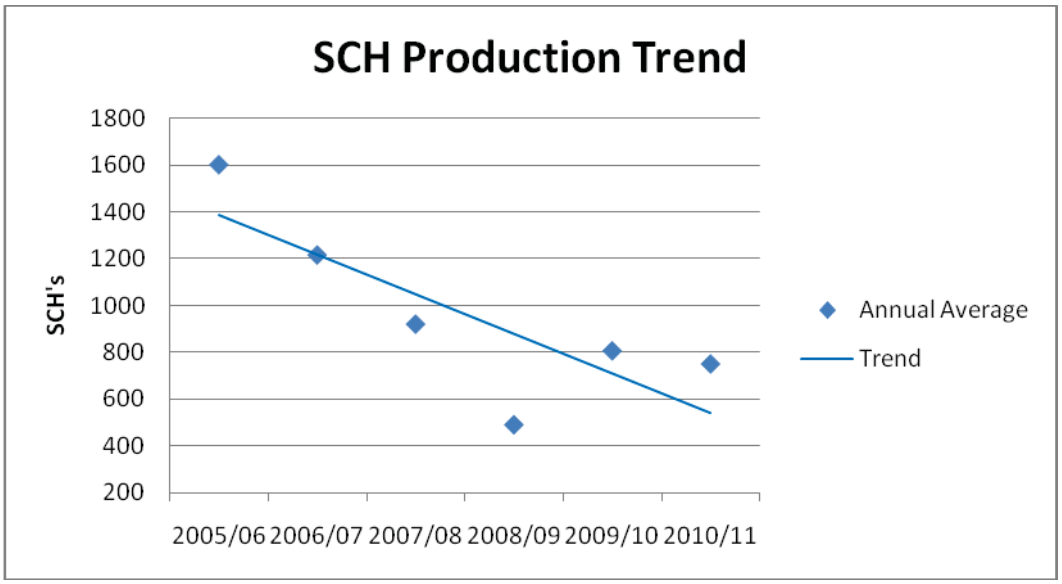
Despite the factors listed above, recent efforts of program faculty are beginning to show. Following a four year decline in enrollment, numbers are on the rise. Although the final numbers for fall 2011 are not yet known, a three year high in both applications and admissions for fall 2011 is interpreted as a good sign.

Program faculty are convinced that partnering with progressive, industry-leading companies particularly those in high-growth markets such as medical, energy, and aerospace will prove valuable in telling the rest of the story and clarifying the wealth of opportunities that exist throughout the world of manufacturing. As president Obama recently stated "We (America) need an all-hands-on-deck effort to reinvigorate American manufacturing."

Program faculty further believe that by capitalizing the new curriculum structure through additional articulations, increased dual enrollments, and direct credit programs the MFGT program could likely sell itself in the future.

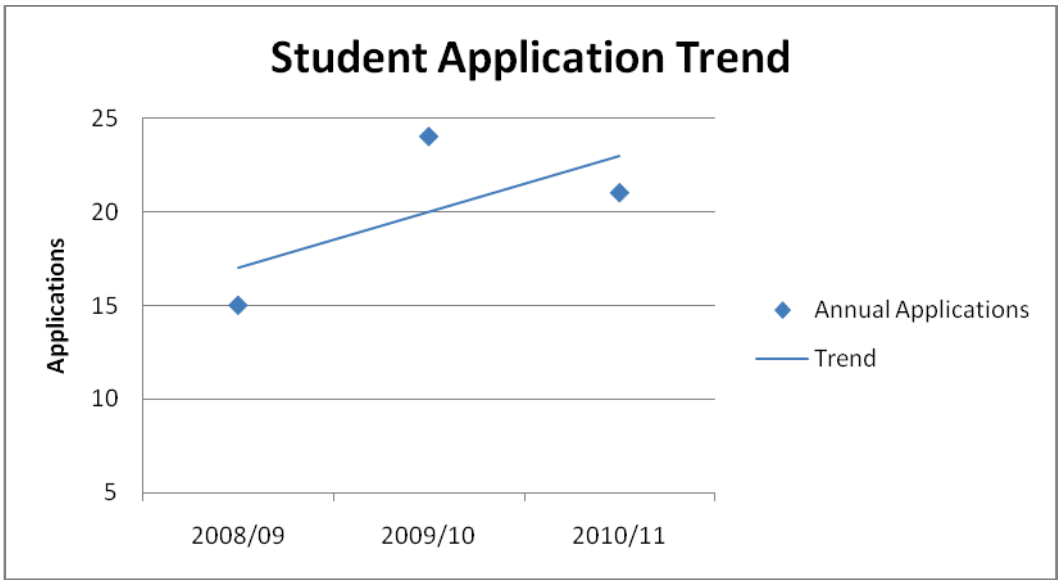
2. Student Credit Hour Production Trend

The annual average number of student credit hours produced by MFGT students and the associated trend is summarized in the graph below.



3. Student Application Trend

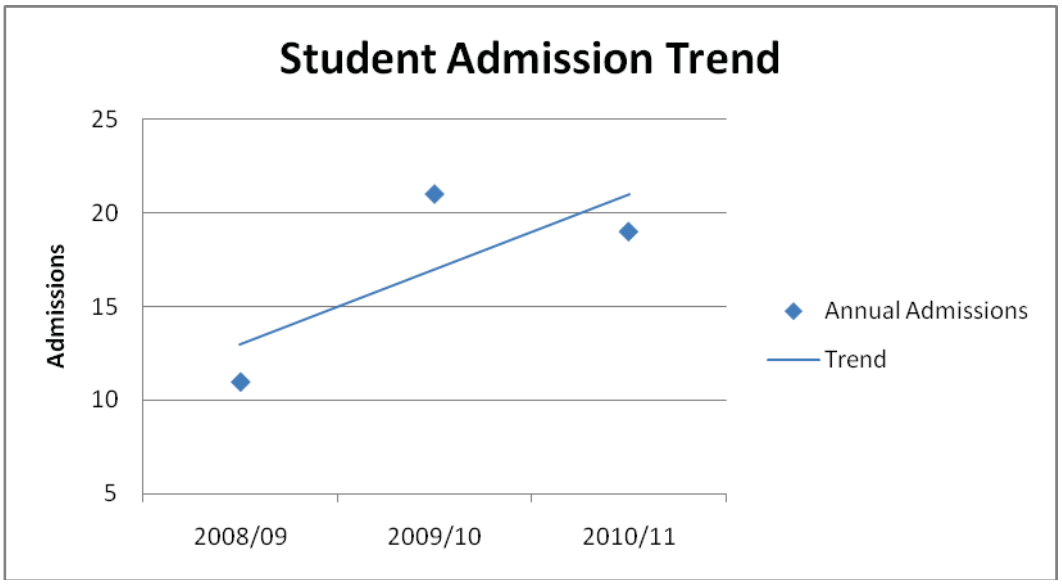
The annual number of student applications to the MFGT program and associated trend is presented in the graph below. Prior to 2008, this data was not tracked. It should also be noted that neither institutional research nor the admissions office captures this data therefore it is not reported as part of the APR data package and must be tracked by each program.



Based on a point-in-time comparison, it is projected that the total number of student applications for fall 2011 will be higher than any of the preceding three years.

4. Student Admission Trend

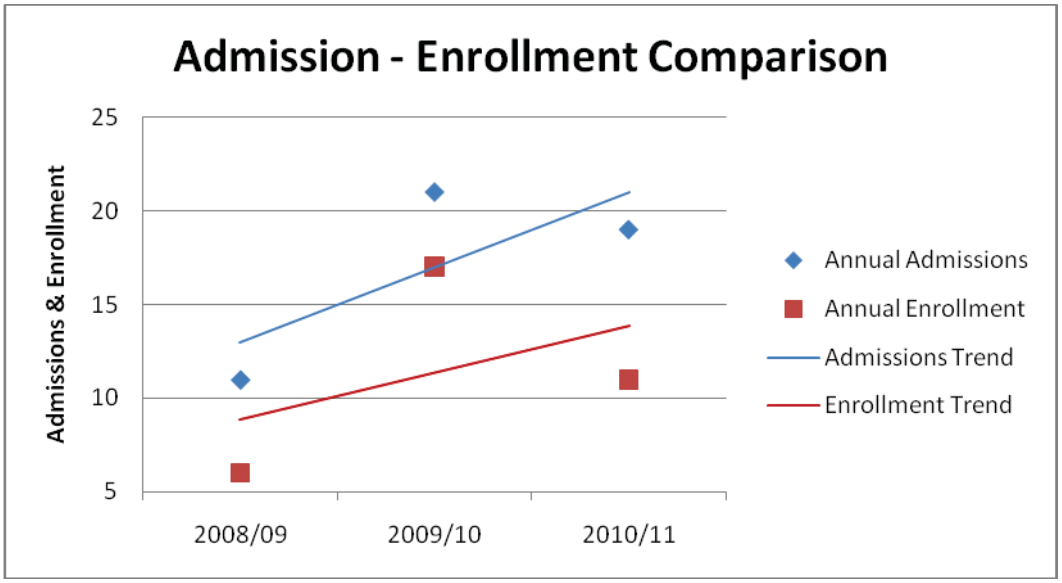
The annual number of student admissions to the MFGT program and associated trend is presented in the graph below. Prior to 2008, this data was not tracked. As with admission numbers, neither institutional research nor the admissions office captures this data therefore it is not reported as part of the APR data package and must be tracked by each program.



Based on a point-in-time comparison, it is projected that the total number of student admissions for fall 2011 will be higher than any of the preceding three years.

5. Admission – Enrollment Comparison

The following chart presents a comparison of admission and 1st year enrollment numbers over the past three years.



6. Enrollment Goals and Strategy

The program's ultimate enrollment goal is to fill the program and run two sections of all major courses. Please see Appendix A, Attachment A-2, Marketing and Recruitment Plan, for a detailed strategy to support this effort.

C. Program Capacity

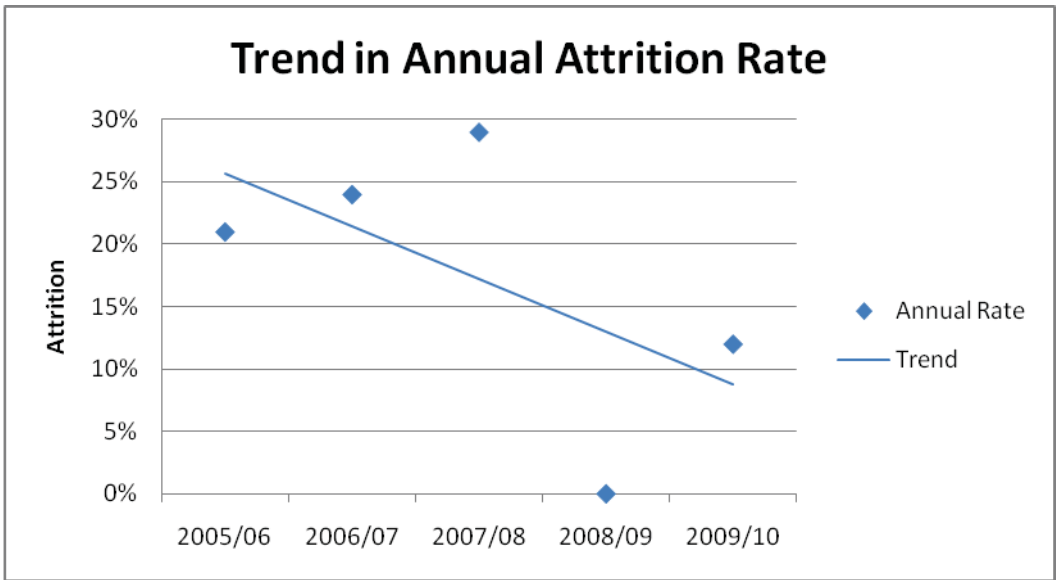
1. Current Program Capacity

MFGT 1st Year Capacity = 30
MFGT 2nd Year Capacity = 30
Total Capacity = 60

D. Retention and Graduation

1. Trend in Annual Attrition Rate

   The following chart presents the annual attrition rate and associated trend.



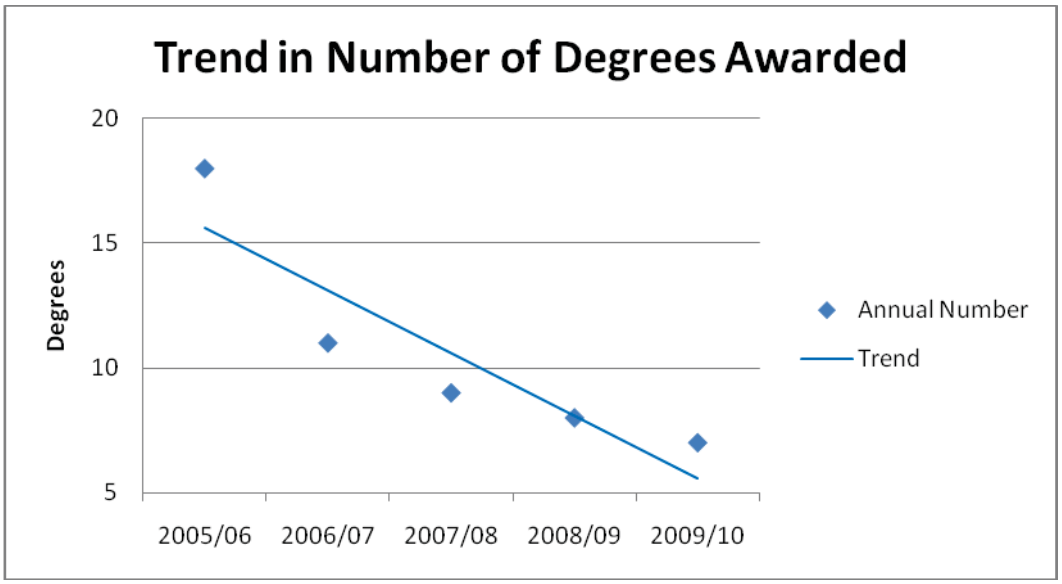
2. Retention Goals and Strategy

   Over the past six years MFGT program faculty have made several changes to both curriculum and internal processes to better ensure higher retention rates. These include the following:

   - Updated course pre-requisites for all classes.
   - Updated curriculum check sheets.
   - Facilitate a progress review Q & A session for all students prior to registration each semester.

3. Trend in Number of Degrees Awarded

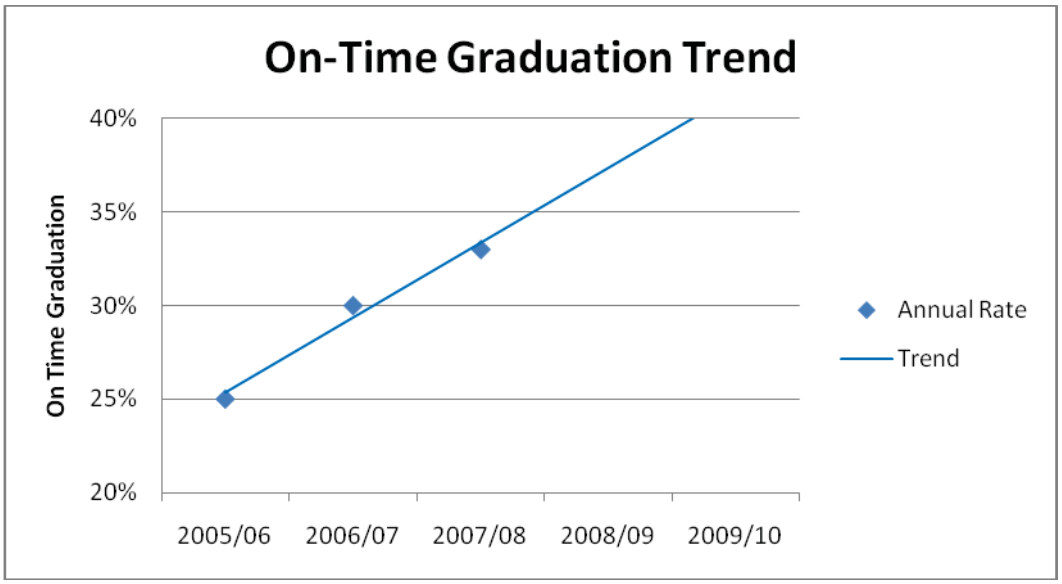
   The following chart presents the number of degrees awarded and associated trend.



Although institutional research has not compiled data for the 2010/11 school year, a quick review of student records indicates that the number of degrees awarded for the 2010/11 school year will be higher than any of the preceding four years.

4. On-Time Graduation Trend

The following chart presents the annual percentage of on-time graduations and associated trend. This data, as provided by institutional research, is compiled in the fall of each year and therefore is only as current as shown below.



As for Spring 2011, it is believed that over 85% of the group of cohorts who first enrolled in the Fall of 2009 have graduated on-time.

5. Average Time for Graduation

   Although it appears that the average time for graduation over the preceding five years is actually three years (6 semesters), it is believed that 85% of the group of cohorts who first enrolled in Fall of 2009 have graduated from the program truly "on-time", in 4 semesters.

E. Access

1. Program Actions to Increase Accessibility

   Recent curriculum revisions including the splitting of combined lecture and labs courses into separate courses, re-distributing credit weight, and modifying course schedules has provided much greater accessibility for both MFGT majors and non-majors.

2. Effects of Actions to Increase Accessibility

   The program is just beginning to realize the impact of these changes through the following indicators:

   - Articulations: In the last three years, the number of articulations is up 400 percent compared to the preceding ten year history.

   - Dual-Enrollment: This past year the program served its first two dual-enrollment students each of whom enrolled in three MFGT courses for fall semester.

   - Service to Non-Majors: The number of non-majors registering for open seats in major courses is up approximately 300 percent.

3. Counter-Effects of Actions to Increase Accessibility

   Although no counter-effects have yet been identified, it's possible that with continued growth, the program could end up with issues in meeting the demand for courses and therefore need to add additional sections. This in turn may create issues regarding the availability of CNC machines and possibly impact open lab opportunities.

F. Curriculum

1. Program Requirements

Entrance Requirements:

Minimum High School GPA of 2.50 and ACT Math Sub-Score of 19

Functionality of the Concentration System:

Please see Appendix E, Attachment E-1, Concentration System Schematic, for a graphical representation of how courses support the dual-concentration system.

Program Check Sheets:

Please see Appendix E, Attachment E-2 and E-3 for detailed curriculum check sheets.

Program Course Syllabi:

Please see Appendix E, Attachment E-4, for a sample course syllabus.

2. Significant Revisions Since Last Review

Two major curriculum revisions have been processed since the last program review. The first of these was processed during the 2006-2007 school year and implemented in the fall of 2008. The second was processed during the 2007-2008 school year and implemented in the fall of 2009. Together these two revisions have completely overhauled the degree resulting in a considerably more efficient and dynamic option that is attractive to a greater number of students. The program now functions as a stepping stone to numerous bachelor's' degree programs. Below is listing of the details of each of these revisions.

<u>Revision #1, Implemented Fall 2008</u>

This revision was defined as a multi-faceted approach to redefining the program and better supporting the needs and goals of all stakeholders. This revision included the following elements and rationale:

- Reduced the overall credit count from 68 credits to 64 credits:

  To provide students greater flexibility in scheduling and an overall lower education cost.

- Split six combined lecture/lab courses into separate lecture and lab courses:

  To better support related programs and the development a new CNC certificate and potential Manufacturing Technology minor. This also facilitates simplified articulation agreements with secondary schools and improves flexibility in scheduling faculty.

- Created additional (lesser-credit) lab courses:

  To facilitate additional articulation options with secondary schools resulting in a greater number of articulating students. This also supports a new CNC certificate and potential Manufacturing Technology minor.

- Replaced a traditional blueprint reading course with a 3-D solid modeling course:

  To better prepare students for working with complex 3-D solids geometry.

- Rebalanced the credit weight of CNC courses:

  To provide a more useful block of lab time and greater flexibility in scheduling for both students and faculty.

- Renumbered all MFGT major courses:

  To support these changes and provide a more logical numbering system.

- Updated all course documentation:

  To provide the basis for a new comprehensive assessment system.

<u>Revision #2: Implemented Fall 2009</u>

This revision was defined as a way to redefine program outcomes, provide students a more diverse educational experience, provide a pathway to higher education opportunities, and to better prepare students who are seeking quality employment opportunities. This revision included the following elements and rationale.

- Established a dual-concentration associate's degree in Manufacturing Technology:

To provide students the option of pursuing a concentration in tooling technology or general processing technology.

To attract students who are looking for a more diversified manufacturing-based education.

- Reduced the overall credit count from 64 credits to 61 credits:

  By implementing the latest manufacturing software and best practices of industry as well as providing technology that is accessible to students outside of scheduled classes, the program can create a more efficient learning environment.

  By offering an open lab two nights/week at four hours/night there is 480 total hours or open lab time available to students. This results in 1080 total hours available for the application of related technology--a 31% increase over the preceding 15 year history. Students who utilize only one-half of the available open lab time still complete the program with a greater amount of time-on-task than those in the preceding 15 years.

  To better accommodate students with a diversified curriculum that is designed to enhance the student's opportunities by providing courses that are efficient, meaningful, and applicable to today's manufacturing environment.

  To provide students greater flexibility in scheduling and an overall lower education cost.

- Adjusted the credit weight of manufacturing lecture and lab courses:

  To facilitate simplified articulation agreements with secondary schools and community colleges.

  To establish the basis for a functional two-plus-two educational pathway.

  To create a well-defined, manageable, and unobstructed path for all students pursuing a higher-level degree in Manufacturing.

  To provide individual, stand-alone course lectures.

  To provide a more structured block of lab time.

To continue developing a CNC certificate and potential Manufacturing Technology minor.

To offer manufacturing courses to industry at a reasonable cost and manageable time.

To provide greater flexibility in student schedules.

- Replacing a traditional handbook calculations course with an applied metrology course:

  To allow for both machining process technology and metrology applications to be learned simultaneously--providing more timely progression of lab activities.

- Redefining course outcomes:

  To provide the basis for a new comprehensive assessment system.

3. Current Curriculum Initiatives in Process

   Program faculty are currently preparing a curriculum proposal to offer a certificate in CNC programming and equipment utilization. It is believed that this certificate will attract additional students and better support the training needs of local manufacturing companies.

   This certificate would also be the first in a series of CNC-related certificates geared toward programming and applying CNC technology.

4. Future Plans for Curriculum Initiatives

   As the program moves into the future and closer to making it's vision a reality, faculty would like to see additional certificates in the areas of Advanced CNC Programming and System Utilization; Multi-Axis Programming and Applications; Multi-Task Programming and Applications; and possibly Micro-Machining Applications. Currently there are no certificate programs available in these areas and the market is in serious need of such options.

G. Quality of Instruction

1. Student and Alumni Perceptions of the Quality of Instruction

   Based on the recent survey of current students, there is no indication of issues regarding the student's perceptions of the quality of instruction.

2. Advisory Committee and Employer Perceptions of the Quality of Instruction

   Based on the recent survey of advisory committee members, there is no indication of issues regarding the quality of instruction. Members strongly agreed with the quality of the program and shared many positive comments.

3. Efforts to Improve the Learning Environment

   The recent implementation of open labs offers students a greater number of opportunities to apply related technology. The push towards advanced CAD/CAM technology in particular, has greatly improved the programs operational efficiencies in second year tooling courses. What used to take 15 weeks is now being done in approximately ten weeks. This allows the program to incorporate more in-depth applications-based projects and ultimately further the learning.

4. Faculty Participation in Professional Development

   With the programs recent push towards advanced technology, faculty have spent considerable hours engaged in professional/technical development. Please see Appendix F, Faculty Information, for faculty specific professional/technical development activities.

5. Efforts to Increase the Interaction of Students with Faculty and Peers

   Due to the nature of MFGT lab courses, students work together in a relational-experiential manner that ensures regular interaction with faculty and peers. Some of the MFGT lab courses utilize team based projects which furthers this interaction. Each year, faculty coordinate a series of field trips and guest lecturers providing students the chance to expand their awareness of industry trends and best practices.

6. Extent of Inclusive Pedagogy and Curriculum on Teaching and Learning

   For several years, the MFGT program has worked with the CAD Drafting / Tool Design and Product Design programs on joint engineering projects requiring cross-program student interaction and cooperation. With the recent developments in the area of special project teams where students from a wide variety of programs join forces to engineer, produce, and compete nationally--the inclusive approach is most observable.

7. Effect of Items (5) and (6) on the Quality of Teaching and Learning

While participating in these activities, both students and faculty are regularly reminded of “the big picture” and learn to appreciate and value the diversity that is experienced throughout industry and around the world.

H. Composition and Quality of Faculty

1. List of Tenured and Tenure-Track Faculty by Rank

   Tenured Faculty

   David Borck, Assistant Professor

   Doug Chase, Associate Professor…… (Retired Spring 2011)

   Dennis Finney, Professor…….. (Retired Spring 2010)

   Dean Krager, Associate Professor

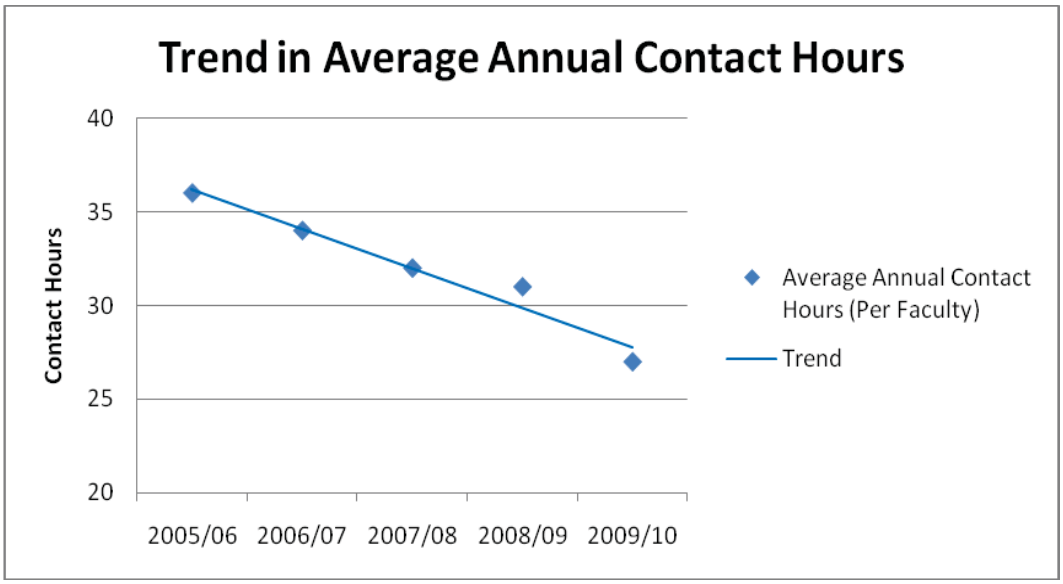
   Louis Nemastil, Associate Professor

2. Faculty Workload Data

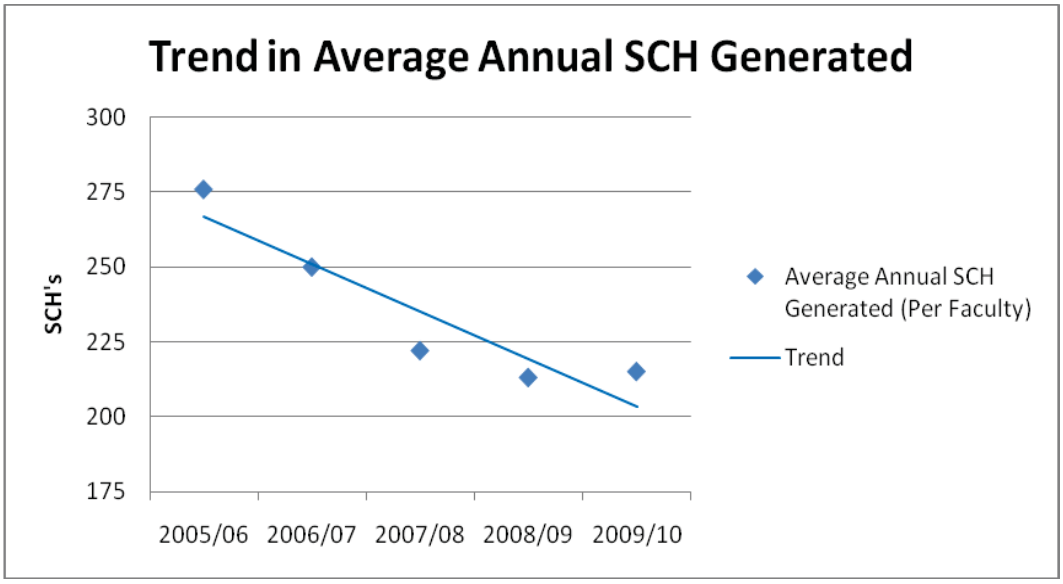
   Due to the intensive labs associated with MFGT courses, normal faculty load is based on contact hours. The standard annual load for full time faculty is 36 contact hours.

   The three remaining MFGT faculty all teach approximately one-half of their annual load covering MFGE courses.

   The average annual contact hours per faculty and associated trend are presented in the following graph.



The average annual student credit hours generated (MFGT courses) per faculty and associated trend are presented in the following graph.



Although both the average annual contact hours per faculty and average annual student credit hours generated per faculty have declined with the drop in enrollment, all four of the MFGT program faculty who taught through Spring 2011 were fully loaded with 36 contact hours each. Although overloads have been somewhat scarce in recent years, it common that at least one faculty member each year accepts an overload of one or two contact hours.

The effect of recent retirements (two from MFGT and one from MFGE) although not represented on the above graphs will result in a greater number of contact hours for those remaining faculty and possibly the addition of at least one part-time adjunct instructor.

As for the past six years, one program faculty member has received a sabbatical but none have received release time despite several major initiatives and a very serious need to get out and actively market the program and recruit students.

3. Faculty Recruitment

   Faculty recruitment process functions per CET guidelines.

4. New Faculty Orientation

   New faculty orientation process functions per CET and University guidelines.

5. Reward Structure

   Faculty reward structure functions per FAA contract and CET promotion/merit policy.

6. Graduate Instruction

   The MFGT program is not currently engaged in graduate-level instruction.

7. Non-Tenure Track and Adjunct Faculty

   The MFGT program currently has only tenured faculty and has not utilized adjunct instructors for the past five years.

I. Service to Non-Majors

The MFGT program offers two service courses to manufacturing related students. These courses include:

- MFGT-150, Manufacturing Processes (2 Credits, 1 + 3 Contact Hours)
- MFGT-252, Advanced Machine Tools (2 Credits, 1 + 3 Contact Hours)

The MFGT-150 course is a general overview course focused on fundamental machining concepts and equipment operation. This course serves four program

areas including: CAD Drafting/Tool Design; Product Design; Mechanical Engineering; and Welding.
The MFGT-252 course is a more advanced overview course focused on programming and operating CNC machining equipment. This course exclusively serves the CAD Drafting/Tool Design program.

J. Degree Program Cost and Productivity Data

The program cost according to the most recent costing analysis dated 2007-2008 includes a total cost per student credit hour of $466.33 and a total program cost of $32,176.46.

Due to the fact that this costing not current and based on the previous curriculum totaling 69 credits, the actual current cost is sure to be different.

Please see Appendix H, MFGT Degree Program Costing, for costing details.

K. Assessment and Evaluation

1. Tracked Variables

   Program faculty have recently identified a series of program outcomes, assessment methods, and criterion for success that will be used to qualify and improve both teaching and learning. The challenge faculty are currently faced with is coming up to speed on the TRAC-DAT system.

2. Variable Trend Data

   With recently implementing a new curriculum and just starting to utilize the TRAC-DAT system, there is currently no variable trend data available.

3. Comparison of Trend Data to Degree Requirements

   Without trend data, comparison of data to degree requirements is not yet possible.

4. Usage of Trend Data to Assess Progress Towards Program Goal

   Without trend data, assessing progress towards program goals is not yet possible.

L. Administrative Effectiveness

1. Adequacy of Administrative and Clerical Support

   Program faculty enjoy having a friendly, competent, and efficient secretary to help support the many tasks associated with running the day to day operations of a developing program.

2. Program and Department Administrative Efficiency

   Program faculty have been well served through recent history with the previous CET organizational structure that included a faculty member serving as the department “chair”. Recent changes to that structure have left program faculty concerned about the efficiency and effectiveness of the new structure which reorganized the CET into multiple “schools” and added another layer of administration. Faculty see this as the exact opposite of implementing “lean” concepts to improve operational efficiency.

3. Class and Teaching Schedule Effectiveness and Efficiency

   Faculty have no issues regarding recent class and teaching schedules.

4. Student Access to Courses

   Recent curriculum revisions including the splitting of combined lecture and labs courses into separate courses, re-distributing credit weight, and modifying course schedules has provided much greater accessibility for both MFGT majors and non-majors.

Section 4

Facilities and Equipment

A. Instructional Environment

1. Adequacy of Current Classrooms, Labs, and Technology

Classrooms

With the recent remodeling of Swan-105B, the primary instructional room for CAD/CAM applications, most regularly scheduled rooms are adequate and meet the program's needs.

Swan-121E, a smaller technology support room in the lab, needs new tables and chairs as these are over 20 years old and most are damaged.

Labs

The Manufacturing Technology Laboratory (Swan-121 and Swan 122) is a bit tight in regard to floor space. A reorganization of the lab would provide better utilization of the available space as well as a safer, more efficient layout of equipment. Due to the existing placement of equipment, conditions exist that put a machine operator directly in line with active walkways. This has been a concern of the program for several years and although minor adjustments have been made, only a complete reorganization and adjustment of the isle ways can permanently resolve these issues.

Humidity is of major concern as well, with tens of thousands of dollars of precision machining and metrology equipment housed in the lab, high levels of humidity have resulted in thousands of dollars of repair and replacement. Currently, every exposed metal surface of precision machines, tooling, and gaging must be sealed in rust preventative prior to any breaks lasting more than a few days. In addition to this, the department's direction toward advanced processing technologies such as micromachining and other nano-type work is absolutely impossible to pursue without an air conditioned environment.

Other concerns regarding the lab facility revolve around aesthetics. Program faculty have worked long and hard to redefine and further develop the program. Currently, the program can boast an up to date curriculum, application of the latest CAD/CAM technology and several other "world class" characteristics; however, the lab simply does not look anything like what one would expect from a "world class" program. The lab is in dire need of paint, floor finishes, and improved lighting.

According to Gary Gawn, former maintenance supervisor, the maintenance crew has spent countless hours over the past ten years attempting to remove the original floor finish so they could reseal the

floors. After numerous unsuccessful attempts it has been determined that the floors must be shot blasted in order to remove the old finish and properly reseal the floors.

It has been nearly 15 years since the lab was last painted and the walls are heavily soiled and stained in some places due to a combination of welding fumes, grinding dust, and significant amounts of humidity.

Although the lighting is reasonable, the light reflectors which were last changed about 15 years ago are heavily corroded and no longer reflect light properly.

In order to prevent the inhalation and accumulation of air born particulate matter, a relatively simple ventilation system should be installed for all grinding equipment. A complete lab reorganization would reduce this system to a single blower and linear duct along the west wall of Swan-122.

Technology

In regard to core technology such as manual machinery, the program has opted to establish a rebuild system rather than attempting to purchase new machines. This results in a huge savings over time and allows more money to be directed to automation and CNC. Although manual machining is no longer a focus of the program, it remains a critical part of the learning process and supports first year MFGT majors, manufacturing related non-majors, all special project teams, and dozens non-major senior projects.

The program recently secured a complete set of Clausing-Colchester Engine lathes that are in need of rebuilding. Due to the robustness and design of these machines a complete rebuild will result in like-new performance and approximately 15 years of additional service. Currently, the program is investigating the rebuild of all ten of the Clausing Colchester lathes.

In addition to the rebuilding the lathes noted above, the program is also looking forward to rebuilding a set of six Harig Surface grinders.

Although the program has several current pieces of automated machining equipment (CNC equipment), the minimal number of machines tends to cause bottlenecks when executing major lab projects. Both MFGT and MFGE students as well as all special project teams would benefit from an additional CNC mill, lathe, and wire EDM.

2. Impact of Current Facilities on Program Delivery

   The greatest impact of the current facilities on program delivery include the potential safety issues with the existing lab layout; frustration on behalf of both students and faculty when older manual machines in need of repair fail to work as they should; and the bottlenecks associated with not having enough CNC equipment.

   Beyond the impact on program delivery, current facilities also have an impact on recruiting. The current visual condition of the lab (paint, floors, and lights) makes on campus visits and program tours a bit embarrassing when guests look closely and notice the need for such improvements.

3. Projected Needs of Program Facilities

   Following is a list of needs regarding classrooms, labs, and technology:

   <u>Classrooms</u>

   - Computer Tables and Chairs (Swan 121-E)

   <u>Labs</u>

   - Complete Reorganization of Manufacturing Lab
   - Air Conditioning throughout Manufacturing Lab
   - Paint, Floor Finish, and Lighting throughout Manufacturing Lab
   - Ventilation System for Grinding Equipment in Swan 122
   - New Workbenches for Project Build Area in Swan 121
   - Additional Storage Cabinets for Tooling and Supplies

   <u>Technology</u>

   - Addition of 1 CNC Vertical Machining Center
   - Upgrading to a Newer CNC Wire EDM
   - Rebuild of 10 Manual Engine Lathes
   - Rebuild of 6 Manual Surface Grinders
   - Addition of 1 CNC Turning Center
   - Upgrading to a Hydraulic Stamping Press
   - Upgrading to a Newer Injection Molding Press

4. Plans for Facility Improvements and Current Status

   For several years the program has submitted plans for capital improvement projects for the manufacturing lab. Approximately three

years ago the program received a site review in regard to painting the lab; however, no further action was taken.

During the summer of 2010 a major lab reorganization was planned; however, while preparing to execute the reorganization, the physical plant announced that their support for some relatively minor electrical and plumbing work would cost the program nearly $7,500. Having previously only been charged for materials, this was simply not accounted for and due to a lack of funds the reorganization was placed on hold.

5. Impact of Facility Improvements on Program Delivery

The facility improvements noted above would not only resolve the issues mentioned earlier but would also improve the operational efficiency of all MFGT and MFGE lab courses as well as open labs.

In addition to this, these improvements would also encourage the hosting of secondary student competitions and other such manufacturing-related educational events.

B. Computer Access and Availability

1. Computing Resources

Swan-105B (Primary Instructional Room for CAD/CAM Applications)

25)Dell Optiplex GX280 PCs including:

- 1GB Primary RAM
- 256K Video RAM
- 80 GB Hard Drive
- DVD R/W/RW
- 17” Flat Panel Display

Swan-121E (Lab Support Room)

8) Dell Optiplex GX280 PCs including:

- 1GB Primary RAM
- 256K Video RAM
- 80 GB Hard Drive
- DVD R/W/RW
- 17” Flat Panel Display

Program Specific Software

Catia v5, r20 (Primary CAD/CAM and Simulation Software):

50) EX2 Licenses
75) DIC Licenses

Delmia v5 r20 (Primary Animation and Documentation Software):

25) ACD Licenses

MasterCam vX (Secondary CAM Software):

33) Mill Level 3 Licenses
33) Lathe Level 2 Licenses
33) Wire EDM Level 2 Licenses

WinMax v10 (Conversational Software):

33) WinMax Mill Licenses
33) WinMax Lathe Licenses

2. Utilization of Computing Resources

Computing resources are used throughout the program and support all MFGT courses, numerous MFGE courses, and several related, non-program courses.

3. Adequacy of Computing Resources and Additional Needs

The number of PCs is adequate but the system configuration is not. The current PCs, which are now five years old, were purchased to support less powerful CAD/CAM applications and now fall seriously short in processor capability, primary RAM, video RAM, and hard drive space. For a program classified as a “power user” of PC related technology, these systems are simply unacceptable and in serious need of replacement.

The desired PC system configuration is as follows:

- 64 Bit Quad-Core Processor
- 4GB Primary RAM
- 1GB Video RAM
- 320 GB Hard Drive
- DVD R/W/RW
- 19” Flat Panel Display

4. Acquisition Plan for Computing Resources

   The program is currently working on a plan to better fund Catia. This software is currently the most advanced and most diverse engineering software in the market; however, it is not free. To date, the annual cost of $10,000 has been covered in part by related industry contributing approximately 30 percent with the rest being split between the MFGT and MFGE programs. Due to the fact that Catia has industry specific modules to support virtually all CET programs, other programs such as Plastics and Rubber are beginning to migrate to Catia and as of this past year, have begun to contribute financially as well. The manufacturing programs hope to increase the annual contribution by industrial partners and rally support through the CET Dean's Office as the use of this software is expanded to other CET programs.

   In regard to PC replacement, this is a very serious concern for both students and faculty. Without support from either the college or university, there is simply no money available to replace these systems at this time.

5. Available Online Resources

   A wealth of on-line resources exist in regard to supporting the MFGT program. Currently faculty and students alike utilize online resources for support material pertaining to tooling components and design, cutting tool applications and parameters, and an array of other related information.

6. Adequacy of Computer Support

   Prior to the 2010/11 school year the adequacy of computer support has been excellent. Computer support personnel provided prompt, friendly service and were easy to work with. Since the recent restructuring of computer support, the adequacy of support has been subpar at best. Technology programs that rely heavily on PC related technology no longer have the close interaction with on-site, experienced technicians who are intimate with program issues and understand the history of troubleshooting related systems. In regard to the level of support required to troubleshoot and maintain program technology- the entire support system no longer works in an efficient and effective manner and students are paying the price.

C. Other Instructional Technology

1. Other Instructional Technologies

One instructional technology available to faculty and students is Tooling University. This online resource provides hundreds of manufacturing-related presentations, self-paced learning modules, and assessment options developed by industry leading companies. All materials are modifiable and could easily be customized and integrated into MFGT courses.

2. Utilization of Other Instructional Technologies

   Having launched a completely updated curriculum during the 2009-2010 school year, program faculty are just beginning to experiment with some of the universities existing instructional support technologies.

   Questions have been raised regarding whether or not the lecture portion of MFGT-150, a related course for non-majors, may lend itself to alternate delivery methods therefore providing operational efficiency improvements.

3. Adequacy of Other Instructional Technologies and Additional Needs

   It seems as though the adequacy of other instructional technologies will be more than sufficient; however, it is difficult to qualify this until these technologies are actually implemented.

4. Acquisition Plan for Other Instructional Technologies

   Currently there is ongoing discussion regarding how to handle the cost of implementing Tooling University. The current educational price is $600/year for the institution and $140/year for students. In an attempt to minimize student's cost, faculty are discussing whether or not to use Tooling University in place of a major textbook.

5. Impact of Other Instructional Technologies on Program

   It is believed that implementing other instructional technologies such as Ferris Connect and Tooling University will help improve the diversity and efficiency of MFGT courses.

D. Library Resources

1. Adequacy of Print, Electronic, and Other Library Resources

   Program faculty find library resources adequate.

2. Library Service and Instruction Availability

Library personnel provide prompt service, do a good job of instructing students on library resources, and provide assistance as needed.

3. Impact of Library Budget Allocation to Program

   To date, the library budget allocation to the MFGT program has been adequate.

Section 5

Conclusions

A. Relationship to FSU Mission

The MFGT program supports the mission of the university by providing unique career-oriented education opportunities through a new, dynamic curriculum structure.

This new curriculum structure provides the following advantages which are clearly supportive of the universities guiding principles and major initiatives:

- Concentration options that stimulate additional interest in the program.
- Improved functionality and increased ability to support articulation, dual-enrollment, and direct credit programs.
- The ability to individually tailor curriculum to a student's interests or the needs of industrial sponsors.
- Greater assurance of on-time graduation.
- Greatly improved functionality as a stepping stone allowing graduates to transfer directly into any of eight bachelor's degree programs.

B. Program Visibility and Distinctiveness

The MFGT program is the only university-based associate degree in the nation offering a comprehensive education in tooling technology. The program boasts the following highlights to gain visibility and identify the uniqueness of the program.

- Unique, Diverse, Project-Based Experience
- Articulation, Dual Enrollment, and Direct Credit Opportunities
- Concentration Options
- Communicating with Industry Standard Process Documentation
- Application of World-Class CAD/CAM Technology
- Direct Entry to Numerous Bachelor Degree Programs
- Support from Industry Leading Companies

The recent implementation of a new dynamic curriculum has received much praise from stake holders including industrial partners, secondary manufacturing related instructors, and recent graduates who have observed the changes while continuing their education. Program faculty are absolutely certain the program is in a better position to attract quality students than ever before. These changes along with higher enrollment standards have already had a positive impact on attracting quality students.

Although the program is very unique and without any direct competition in the area of tooling applications, prospective students interested in pursuing a manufacturing associates degree as either a terminal degree or a stepping stone are often confused by propaganda from community colleges promoting

manufacturing related associate degrees with CAD/CAM courses. It is critically important for the program to get the word out as to the uniqueness of the program, extent of technology application, and continuing education opportunities for program graduates.

C. Program Value

The program is truly one-of-a-kind in providing a tooling focused manufacturing education and as such is well respected throughout the industry. The recent implementation of a new dynamic curriculum allows the program to serve as an excellent stepping stone for those wanting to pursue a related bachelor's degree.

New curriculum structure provides non-majors opportunities for additional technical electives and better supports cross-programmatic projects.

The MFGT lab facility serves as the central coordination center for special project team manufacturing efforts and has seen a significant increase in use over the past few years.

Both the university and local community regularly benefit from the resources associated with the MFGT lab facility. The university alone enjoys a savings of approximately $7,500 per year in precision service and repair work performed in the MFGT lab facility that would otherwise require outside services and much longer lead times.

D. Enrollment

Program enrollment is beginning to recover following an all-time low experienced in 2007-2008 and 2008-2009 as a result of the combined effects of negative press, the recession, and new high school graduation requirements.

Faculty have received a great deal of encouragement from both industrial partners and secondary program instructors regarding the value of the recently implemented curriculum.

Faculty have already begun work on an extensive marketing and recruitment campaign but currently lack the funds and release time required to support this effort. The program anticipates marketing and recruiting expenses ranging from $5,000 to $7,500 over the next two to three years. Visiting potential feeder schools to develop new relationships and the production/delivery of poster boards and information packages are expected to be the most significant costs of this effort.

E. Characteristics, Quality, and Employability of Students

Program graduates demonstrate a solid technical foundation by applying the science and methodology of precision machining technology to CNC-based tooling applications. Graduates are well-versed in core machining operations, basic metrology, parametric modeling, CNC programming, and CNC machine utilization. Experience is gained through tooling application courses focused on producing jigs and fixtures, metal forming dies, and plastic molds.

The MFGT program is synonymous with high-quality, technically competent graduates. Several industry leading companies have correlated their success in tool manufacturing to a history of hiring MFGT graduates. Although numerous companies recruit annually, some regularly go beyond and serve lunch to all program students just for an opportunity to inform students of their openings. Despite the recent slowdown in U.S. manufacturing, a shortage of technically competent tooling-related workers has left companies searching for personnel to fill these positions. Over the past few years, on several occasions, program faculty been contacted by recruiting companies commissioned by major corporations to find associate-level tooling graduates for positions ranging from tool makers to tooling engineers. This level of recruiting for associate-level graduates was simply unheard of ten years ago.

F. Quality of Curriculum and Instruction

Based on the recent survey of students and advisory committee members, there is no indication of issues regarding the quality of instruction.

Faculty are confident that the new curriculum will produce the most competent and technologically capable graduates in the history of the MFGT program--allowing the program to further advance towards it's vision of leading the nation in tooling and process education.

G. Composition and Quality of Faculty

Based on the recent survey of students and advisory committee members, there is no indication of issues regarding the quality of the faculty.

Faculty are fully aware of the need to progress in professional/technical development and continue implementing industrial and academic best practices.

FERRIS STATE UNIVERSITY

Manufacturing Tooling APR - Advisory Board

Based on a schedule that spans six years, every academic program has the opportunity to examine itself using a variety of survey instruments and other measures. The resultant self-study will permit the program, department, college, Division of Academic Affairs, and the University to make informed decisions about curricular issues and resource allocations.

As part of the Academic Program Review (ARP), the Manufacturing Tooling Program is asking advisory board members of the past 6 years to take a few minutes to fill out this survey regarding the program

1. **Please indicate your level of agreement with each of the following statements.**

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree	Don't Know
The MFGT program is consistent with the mission of Ferris State University					
The programs are guided by an effective advisory board					
The quality of the MFGT program at Ferris State University compares favorably with similar programs around the country					
Instructional content reflects what is needed to be successful in today's workplace					
Program faculty possesses knowledge of current practices					
Program faculty teaches current practices					
Program faculty provides students with appropriate classroom activities					
Program faculty has good rapport with students					
Program faculty provides students with appropriate academic advising					
Program faculty provides students with appropriate advising about career planning & placement					
The Ferris State University administration supports the MFGT program					
The current operating budget is sufficient to meet program needs					
The number of qualified tenure-track faculty is sufficient to meet program needs					
The program has adequate resources allocated for coordination & administration					
MFGT program students are well prepared to enter the workforce					
Ferris State University's MFGT program prepares students to enter industry better than other schools					
MFGT program grads contribute as much as other grads in their first 6 months of employment					
MFGT program provides a foundation for multiple career possibilities					
Adequate placement assistance is provided to graduates					
There are a number of varied internships available to students					
There are a number of high quality internships available to students					
There are job opportunities available to Ferris State University MFGT program graduates					

2. **What qualities/skills (if any) do you feel are lacking in graduates of the MFGT program?**

3. **What do you see as the strengths of the MFGT program?**

4. **What do you see as areas needing improvement?**

5. **Please provide comments & suggestions that would help to better prepare future graduates.**

6. **Please use this space for any other additional comments.**

Thank you for your time and assistance.

MFGT APR...Current Students

Frequencies

Prepared by: Institutional Research & Testing, 10/10

Statistics

	N				
	Valid	Missing	Mean	Median	Std. Deviation
q1.a Available	11	1	3.45	4.00	.688
q1.b Conveniently located	11	1	3.82	4.00	.405
q1.c Based on realistic prerequisites	11	1	3.36	3.00	.674
q1.d Available at a moderate cost	11	1	2.36	2.00	.924
q2.a Are available to students	12	0	3.25	3.00	.622
q2.b Describe what you will learn in the course	11	1	3.36	3.00	.505
q2.c Are used by the instructor to keep you aware of your progress	11	1	2.91	3.00	.944
q3.a Meet your occupational needs	11	1	3.09	3.00	.831
q3.b Meet your occupational interests	11	1	3.27	3.00	.647
q3.c Meet your occupational objectives	11	1	3.27	3.00	.647
q3.d Provide supervised practice for developing job skills	11	1	3.27	3.00	.905
q4.a Pertinent to occupational instruction	11	1	2.55	3.00	.688
q4.b Current and meaningful to you	11	1	2.45	3.00	.688
q5.a Readily available at convenient locations	11	1	2.91	3.00	.701
q5.b Readily available to both day and evening students	11	1	2.91	3.00	.831
q5.c Coordinated with classroom instruction	12	0	3.17	3.00	.835
q5.d Coordinated with employer supervision	11	1	2.64	3.00	.924
q6.a Meets your needs	12	0	3.25	3.00	.754
q6.b Meets your interests	12	0	3.58	4.00	.515
q6.c Helps you plan your progress	11	1	3.09	3.00	.701
q6.d Helps you understand your rights and responsibilities	11	1	2.91	3.00	.539
q6.e Helps you evaluate job opportunities	11	1	2.82	3.00	.751
q6.f Is provided by knowledgeable, interested staff	11	1	3.00	3.00	.775
q6.g Explains non-traditional opportunities for both sexes	11	1	2.73	3.00	.786
q7.a Is provided to help you make career decisions	11	1	2.91	3.00	.944
q7.b Indicates how many job opportunities there are in your occupation	11	1	2.91	3.00	1.044
q7.c Identifies where these job opportunities are located	11	1	3.09	3.00	.944

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing			
q7.d Tells about job advancement opportunities	11	1	3.00	3.00	1.000
q8.a Helps you find employment opportunities	11	1	2.82	3.00	.874
q8.b Prepare you to apply for a job	11	1	3.27	3.00	.905
q9.a Know the subject matter	12	0	3.33	3.00	.651
q9.b Know the occupational requirements	11	1	3.27	4.00	1.009
q9.c Are available to provide help when you need it	11	1	3.36	4.00	.809
q9.d Provide instruction so it is interesting	11	1	3.00	3.00	.894
q9.e Provide instruction so it is understandable	11	1	3.18	3.00	.751
q10.a Available to meet your needs	12	0	2.67	3.00	1.073
q10.b Available to meet your interests	11	1	2.64	3.00	1.027
q10.c Provided by knowledgeable, interested staff	12	0	2.92	3.00	.900
q11.a Provide adequate lighting, ventilation, heating, power and other utilities	12	0	3.25	3.00	.622
q11.b Include enough workstations for the number of students enrolled	11	1	1.73	1.00	.905
q11.c Are safe	11	1	3.73	4.00	.467
q11.d Are functional	11	1	3.64	4.00	.505
q11.e Are well maintained	11	1	3.55	4.00	.688
q11.f Are available on an equal basis for all students	12	0	3.17	3.00	.835
q12.a Current and representative of industry	12	0	2.83	3.00	.835
q12.b In sufficient quantities to avoid long delays in use	10	2	3.10	3.00	.876
q12.c Safe	12	0	3.75	4.00	.452
q12.d In good condition	12	0	3.33	3.00	.651
q13.a Available and conveniently located for use as needed	12	0	3.08	3.00	.669
q13.b Current and meaningful to the subject	12	0	2.92	3.00	.669
q13.c Not biased toward "traditional" sex roles	12	0	3.42	3.00	.793
q13.d Available at a reasonable cost	12	0	2.00	2.00	1.044
q14 Additional comments	12	0			

Frequency Table

q1.a Available

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	8.3	9.1	9.1
	Somewhat Agree	4	33.3	36.4	45.5
	Strongly Agree	6	50.0	54.5	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q1.b Conveniently located

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	16.7	18.2	18.2
	Strongly Agree	9	75.0	81.8	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q1.c Based on realistic prerequisites

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	8.3	9.1	9.1
	Somewhat Agree	5	41.7	45.5	54.5
	Strongly Agree	5	41.7	45.5	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q1.d Available at a moderate cost

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	16.7	18.2	18.2
	Somewhat Disagree	4	33.3	36.4	54.5
	Somewhat Agree	4	33.3	36.4	90.9
	Strongly Agree	1	8.3	9.1	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q2.a Are available to students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	8.3	8.3	8.3
	Somewhat Agree	7	58.3	58.3	66.7
	Strongly Agree	4	33.3	33.3	100.0
	Total	12	100.0	100.0	

q2.b Describe what you will learn in the course

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	7	58.3	63.6	63.6
	Strongly Agree	4	33.3	36.4	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q2.c Are used by the instructor to keep you aware of your progress

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	1	8.3	9.1	18.2
	Somewhat Agree	8	66.7	72.7	90.9
	Don't Know	1	8.3	9.1	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q3.a Meet your occupational needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Agree	7	58.3	63.6	72.7
	Strongly Agree	3	25.0	27.3	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q3.b Meet your occupational interests

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	8.3	9.1	9.1
	Somewhat Agree	6	50.0	54.5	63.6
	Strongly Agree	4	33.3	36.4	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q3.c Meet your occupational objectives

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	8.3	9.1	9.1
	Somewhat Agree	6	50.0	54.5	63.6
	Strongly Agree	4	33.3	36.4	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q3.d Provide supervised practice for developing job skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Agree	5	41.7	45.5	54.5
	Strongly Agree	5	41.7	45.5	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q4.a Pertinent to occupational instruction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	3	25.0	27.3	36.4
	Somewhat Agree	7	58.3	63.6	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q4.b Current and meaningful to you

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	4	33.3	36.4	45.5
	Somewhat Agree	6	50.0	54.5	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q5.a Readily available at convenient locations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Agree	9	75.0	81.8	90.9
	Strongly Agree	1	8.3	9.1	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q5.b Readily available to both day and evening students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	1	8.3	9.1	18.2
	Somewhat Agree	7	58.3	63.6	81.8
	Strongly Agree	2	16.7	18.2	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q5.c Coordinated with classroom instruction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	8.3	8.3
	Somewhat Agree	7	58.3	58.3	66.7
	Strongly Agree	4	33.3	33.3	100.0
	Total	12	100.0	100.0	

q5.d Coordinated with employer supervision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	16.7	18.2	18.2
	Somewhat Disagree	1	8.3	9.1	27.3
	Somewhat Agree	7	58.3	63.6	90.9
	Strongly Agree	1	8.3	9.1	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q6.a Meets your needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	16.7	16.7	16.7
	Somewhat Agree	5	41.7	41.7	58.3
	Strongly Agree	5	41.7	41.7	100.0
	Total	12	100.0	100.0	

q6.b Meets your interests

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	5	41.7	41.7	41.7
	Strongly Agree	7	58.3	58.3	100.0
	Total	12	100.0	100.0	

q6.c Helps you plan your progress

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	16.7	18.2	18.2
	Somewhat Agree	6	50.0	54.5	72.7
	Strongly Agree	3	25.0	27.3	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q6.d Helps you understand your rights and responsibilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	16.7	18.2	18.2
	Somewhat Agree	8	66.7	72.7	90.9
	Strongly Agree	1	8.3	9.1	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q6.e Helps you evaluate job opportunities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	1	8.3	9.1	18.2
	Somewhat Agree	8	66.7	72.7	90.9
	Strongly Agree	1	8.3	9.1	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q6.f Is provided by knowledgeable, interested staff

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Agree	8	66.7	72.7	81.8
	Strongly Agree	2	16.7	18.2	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q6.g Explains non-traditional opportunities for both sexes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	2	16.7	18.2	27.3
	Somewhat Agree	7	58.3	63.6	90.9
	Strongly Agree	1	8.3	9.1	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q7.a Is provided to help you make career decisions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	2	16.7	18.2	27.3
	Somewhat Agree	5	41.7	45.5	72.7
	Strongly Agree	3	25.0	27.3	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q7.b Indicates how many job opportunities there are in your occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	3	25.0	27.3	36.4
	Somewhat Agree	3	25.0	27.3	63.6
	Strongly Agree	4	33.3	36.4	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q7.c Identifies where these job opportunities are located

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	1	8.3	9.1	18.2
	Somewhat Agree	5	41.7	45.5	63.6
	Strongly Agree	4	33.3	36.4	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q7.d Tells about job advancement opportunities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	2	16.7	18.2	27.3
	Somewhat Agree	4	33.3	36.4	63.6
	Strongly Agree	4	33.3	36.4	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q8.a Helps you find employment opportunities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	2	16.7	18.2	27.3
	Somewhat Agree	6	50.0	54.5	81.8
	Strongly Agree	2	16.7	18.2	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q8.b Prepare you to apply for a job

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Agree	5	41.7	45.5	54.5
	Strongly Agree	5	41.7	45.5	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q9.a Know the subject matter

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	8.3	8.3	8.3
	Somewhat Agree	6	50.0	50.0	58.3
	Strongly Agree	5	41.7	41.7	100.0
	Total	12	100.0	100.0	

q9.b Know the occupational requirements

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	1	8.3	9.1	18.2
	Somewhat Agree	3	25.0	27.3	45.5
	Strongly Agree	6	50.0	54.5	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q9.c Are available to provide help when you need it

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	16.7	18.2	18.2
	Somewhat Agree	3	25.0	27.3	45.5
	Strongly Agree	6	50.0	54.5	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q9.d Provide instruction so it is interesting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	9.1	9.1
	Somewhat Disagree	1	8.3	9.1	18.2
	Somewhat Agree	6	50.0	54.5	72.7
	Strongly Agree	3	25.0	27.3	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q9.e Provide instruction so it is understandable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	16.7	18.2	18.2
	Somewhat Agree	5	41.7	45.5	63.6
	Strongly Agree	4	33.3	36.4	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q10.a Available to meet your needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	16.7	16.7	16.7
	Somewhat Disagree	3	25.0	25.0	41.7
	Somewhat Agree	4	33.3	33.3	75.0
	Strongly Agree	3	25.0	25.0	100.0
	Total	12	100.0	100.0	

q10.b Available to meet your interests

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	16.7	18.2	18.2
	Somewhat Disagree	2	16.7	18.2	36.4
	Somewhat Agree	5	41.7	45.5	81.8
	Strongly Agree	2	16.7	18.2	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q10.c Provided by knowledgeable, interested staff

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	8.3	8.3
	Somewhat Disagree	2	16.7	16.7	25.0
	Somewhat Agree	6	50.0	50.0	75.0
	Strongly Agree	3	25.0	25.0	100.0
	Total	12	100.0	100.0	

q11.a Provide adequate lighting, ventilation, heating, power and other utilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	8.3	8.3	8.3
	Somewhat Agree	7	58.3	58.3	66.7
	Strongly Agree	4	33.3	33.3	100.0
	Total	12	100.0	100.0	

q11.b Include enough workstations for the number of students enrolled

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	50.0	54.5	54.5
	Somewhat Disagree	2	16.7	18.2	72.7
	Somewhat Agree	3	25.0	27.3	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q11.c Are safe

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	3	25.0	27.3	27.3
	Strongly Agree	8	66.7	72.7	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q11.d Are functional

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	33.3	36.4	36.4
	Strongly Agree	7	58.3	63.6	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q11.e Are well maintained

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	8.3	9.1	9.1
	Somewhat Agree	3	25.0	27.3	36.4
	Strongly Agree	7	58.3	63.6	100.0
	Total	11	91.7	100.0	
Missing	System	1	8.3		
Total		12	100.0		

q11.f Are available on an equal basis for all students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	3	25.0	25.0	25.0
	Somewhat Agree	4	33.3	33.3	58.3
	Strongly Agree	5	41.7	41.7	100.0
	Total	12	100.0	100.0	

q12.a Current and representative of industry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	8.3	8.3	8.3
	Somewhat Disagree	2	16.7	16.7	25.0
	Somewhat Agree	7	58.3	58.3	83.3
	Strongly Agree	2	16.7	16.7	100.0
	Total	12	100.0	100.0	

q12.b In sufficient quantities to avoid long delays in use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	3	25.0	30.0	30.0
	Somewhat Agree	3	25.0	30.0	60.0
	Strongly Agree	4	33.3	40.0	100.0
	Total	10	83.3	100.0	
Missing	System	2	16.7		
Total		12	100.0		

q12.c Safe

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	3	25.0	25.0	25.0
	Strongly Agree	9	75.0	75.0	100.0
	Total	12	100.0	100.0	

q12.d In good condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	8.3	8.3	8.3
	Somewhat Agree	6	50.0	50.0	58.3
	Strongly Agree	5	41.7	41.7	100.0
	Total	12	100.0	100.0	

q13.a Available and conveniently located for use as needed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	16.7	16.7	16.7
	Somewhat Agree	7	58.3	58.3	75.0
	Strongly Agree	3	25.0	25.0	100.0
	Total	12	100.0	100.0	

q13.b Current and meaningful to the subject

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	3	25.0	25.0	25.0
	Somewhat Agree	7	58.3	58.3	83.3
	Strongly Agree	2	16.7	16.7	100.0
	Total	12	100.0	100.0	

q13.c Not biased toward "traditional" sex roles

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	8.3	8.3	8.3
	Somewhat Agree	6	50.0	50.0	58.3
	Strongly Agree	4	33.3	33.3	91.7
	Don't Know	1	8.3	8.3	100.0
	Total	12	100.0	100.0	

q13.d Available at a reasonable cost

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	41.7	41.7	41.7
	Somewhat Disagree	3	25.0	25.0	66.7
	Somewhat Agree	3	25.0	25.0	91.7
	Strongly Agree	1	8.3	8.3	100.0
	Total	12	100.0	100.0	

q14 Additional comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	75.0	75.0	75.0
	Manufacturing lab needs more CNC machinery.	1	8.3	8.3	83.3
	more machines would be nice and having classes available at more than one time during the semester would help too	1	8.3	8.3	91.7
	We need instructors that are able to teach how to produce a part. This program is too centered on learning Catia instead of learning how to cut steel. The program also needs people that are able to teach and know about working in industry as well.	1	8.3	8.3	100.0
	Total	12	100.0	100.0	

MFGT APR...Faculty

Frequencies

Prepared by: Institutional Research & Testing, 09/10

Statistics

	N				
	Valid	Missing	Mean	Median	Std. Deviation
q1.a Participation in development of college occupational education program plan	5	0	2.80	3.00	.837
q1.b Program goals	5	0	3.20	4.00	1.095
q1.c Course objectives	5	0	3.40	4.00	.894
q1.d Competency based performance objectives	5	0	3.20	4.00	1.304
q1.e Use of competency based performance objectives	5	0	3.20	4.00	1.304
q1.f Use of information on labor market needs	5	0	3.00	4.00	1.414
q1.g Use of information on job performance requirements	5	0	3.20	4.00	1.304
q1.h Use of profession/industry standards	5	0	3.20	4.00	1.304
q1.i Use of student follow-up information	5	0	2.20	2.00	1.304
q2.a Adaptation of instruction	5	0	3.40	4.00	.894
q2.b Relevance of supportive courses	5	0	3.60	4.00	.894
q2.c Coordination with other community agencies and educational programs	5	0	3.00	3.00	1.225
q2.d Provision for work experience, cooperative education or clinical experience	5	0	3.40	4.00	1.342
q2.e Program availability and accessibility	5	0	3.00	4.00	1.414
q2.f Provision for the disadvantaged	5	0	4.00	4.00	1.225
q2.g Provision for the handicapped	5	0	4.00	4.00	1.225
q2.h Efforts to achieve sex equity	5	0	3.20	3.00	.837
q2.i Provision for program advisement	5	0	3.60	4.00	.894
q2.j Provision for career planning and guidance	5	0	3.60	4.00	.894
q2.k Adequacy of career planning and guidance	5	0	3.40	4.00	.894
q2.l Provision for employability information	5	0	3.00	4.00	1.414
q2.m Placement effectiveness for students in program	5	0	3.00	4.00	1.414
q2.n Student follow-up system	5	0	2.20	2.00	.837
q2.o Promotion of this program	5	0	2.60	3.00	1.517
q3.a Provision for leadership and coordination	5	0	2.20	2.00	1.304
q3.b Qualifications of administrators and supervisors	5	0	2.20	2.00	1.095
q3.c Instructional staffing	5	0	2.80	3.00	.447
q3.d Qualifications of instructional staff	5	0	2.20	2.00	.837

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing			
q3.e Professional development opportunities	5	0	3.80	4.00	.447
q3.f Use of instructional support staff	5	0	3.40	3.00	.548
q3.g Use of clerical support staff	5	0	3.80	4.00	.447
q3.h Adequacy and availability of instructional equipment	5	0	2.80	3.00	.837
q3.i Maintenance and safety of instructional equipment	5	0	3.40	4.00	.894
q3.j Adequacy of instructional facilities	5	0	2.80	3.00	1.304
q3.k Scheduling of instructional facilities	5	0	3.40	4.00	.894
q3.l Adequacy and availability of materials and supplies	5	0	3.20	3.00	.837
q3.m Adequacy and availability of learning resources	5	0	3.20	3.00	.837
q3.n Use of advisory committee	5	0	2.20	3.00	1.095
q3.o Provisions in current operating budget	5	0	2.60	3.00	1.140
q3.p Provisions for capital outlay budget for equipment	5	0	2.40	3.00	1.342
q4 Additional comments	5	0			

Frequency Table

q1.a Participation in development of college occupational education program plan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	40.0	40.0	40.0
	Somewhat Agree	2	40.0	40.0	80.0
	Strongly Agree	1	20.0	20.0	100.0
	Total	5	100.0	100.0	

q1.b Program goals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	40.0	40.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q1.c Course objectives

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Somewhat Agree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q1.d Competency based performance objectives

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Agree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q1.e Use of competency based performance objectives

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Agree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q1.f Use of information on labor market needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Disagree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q1.g Use of information on job performance requirements

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Agree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q1.h Use of profession/industry standards

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Agree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q1.i Use of student follow-up information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	40.0	40.0	40.0
	Somewhat Disagree	1	20.0	20.0	60.0
	Somewhat Agree	1	20.0	20.0	80.0
	Strongly Agree	1	20.0	20.0	100.0
	Total	5	100.0	100.0	

q2.a Adaptation of instruction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Somewhat Agree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q2.b Relevance of supportive courses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Strongly Agree	4	80.0	80.0	100.0
	Total	5	100.0	100.0	

q2.c Coordination with other community agencies and educational programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Agree	2	40.0	40.0	60.0
	Strongly Agree	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q2.d Provision for work experience, cooperative education or clinical experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Strongly Agree	4	80.0	80.0	100.0
	Total	5	100.0	100.0	

q2.e Program availability and accessibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Disagree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q2.f Provision for the disadvantaged

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Strongly Agree	2	40.0	40.0	60.0
	Don't Know	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q2.g Provision for the handicapped

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Strongly Agree	2	40.0	40.0	60.0
	Don't Know	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q2.h Efforts to achieve sex equity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Somewhat Agree	2	40.0	40.0	60.0
	Strongly Agree	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q2.i Provision for program advisement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Strongly Agree	4	80.0	80.0	100.0
	Total	5	100.0	100.0	

q2.j Provision for career planning and guidance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Strongly Agree	4	80.0	80.0	100.0
	Total	5	100.0	100.0	

q2.k Adequacy of career planning and guidance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Somewhat Agree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q2.l Provision for employability information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Disagree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q2.m Placement effectiveness for students in program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Disagree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q2.n Student follow-up system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Disagree	2	40.0	40.0	60.0
	Somewhat Agree	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q2.o Promotion of this program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	40.0	40.0	40.0
	Somewhat Agree	1	20.0	20.0	60.0
	Strongly Agree	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q3.a Provision for leadership and coordination

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	40.0	40.0	40.0
	Somewhat Disagree	1	20.0	20.0	60.0
	Somewhat Agree	1	20.0	20.0	80.0
	Strongly Agree	1	20.0	20.0	100.0
	Total	5	100.0	100.0	

q3.b Qualifications of administrators and supervisors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Disagree	3	60.0	60.0	80.0
	Strongly Agree	1	20.0	20.0	100.0
	Total	5	100.0	100.0	

q3.c Instructional staffing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Somewhat Agree	4	80.0	80.0	100.0
	Total	5	100.0	100.0	

q3.d Qualifications of instructional staff

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Disagree	2	40.0	40.0	60.0
	Somewhat Agree	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q3.e Professional development opportunities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	20.0	20.0	20.0
	Strongly Agree	4	80.0	80.0	100.0
	Total	5	100.0	100.0	

q3.f Use of instructional support staff

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	3	60.0	60.0	60.0
	Strongly Agree	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q3.g Use of clerical support staff

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	20.0	20.0	20.0
	Strongly Agree	4	80.0	80.0	100.0
	Total	5	100.0	100.0	

q3.h Adequacy and availability of instructional equipment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	40.0	40.0	40.0
	Somewhat Agree	2	40.0	40.0	80.0
	Strongly Agree	1	20.0	20.0	100.0
	Total	5	100.0	100.0	

q3.i Maintenance and safety of instructional equipment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Somewhat Agree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q3.j Adequacy of instructional facilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Disagree	1	20.0	20.0	40.0
	Somewhat Agree	1	20.0	20.0	60.0
	Strongly Agree	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q3.k Scheduling of instructional facilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Somewhat Agree	1	20.0	20.0	40.0
	Strongly Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q3.l Adequacy and availability of materials and supplies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Somewhat Agree	2	40.0	40.0	60.0
	Strongly Agree	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q3.m Adequacy and availability of learning resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	20.0	20.0	20.0
	Somewhat Agree	2	40.0	40.0	60.0
	Strongly Agree	2	40.0	40.0	100.0
	Total	5	100.0	100.0	

q3.n Use of advisory committee

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	40.0	40.0	40.0
	Somewhat Agree	3	60.0	60.0	100.0
	Total	5	100.0	100.0	

q3.o Provisions in current operating budget

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	20.0	20.0	20.0
	Somewhat Disagree	1	20.0	20.0	40.0
	Somewhat Agree	2	40.0	40.0	80.0
	Strongly Agree	1	20.0	20.0	100.0
	Total	5	100.0	100.0	

q3.p Provisions for capital outlay budget for equipment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	40.0	40.0	40.0
	Somewhat Agree	2	40.0	40.0	80.0
	Strongly Agree	1	20.0	20.0	100.0
	Total	5	100.0	100.0	

q4 Additional comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	60.0	60.0	60.0
	During the past 3 years this program has been completely overhauled in regard to curriculum and the application of CAD/CAM technology; today we can offer an up-to-date, dynamic Associates Degree which functions as a solid stepping stone to numerous Bachlors Degree programs. Over the last year an incredible amount of time and energy has been spent visiting secondary feeder schools attempting to recruit new students. We have been actively advertising the new curriculum for approximately the past nine months. Currently we find ourselves in an uncomfortable position as we advertise an up-to-date curriculum and some of the latest CAD/CAD technology yet the lab facility shows poorly as most secondary and community college prgrams have newer equipment and bright, well-organized facilities. The lab is in desperate need of fresh paint, new light reflectors, and floor finishes as well as some minor utility upgrades and a complete reorganization.	1	20.0	20.0	80.0
	In the past two years the MFGT Program has changed curriculum twice. Faculty have lost touch with what students and industry need.	1	20.0	20.0	100.0
	Total	5	100.0	100.0	

MFGT APR...Advisory Board

Frequencies

Prepared by: Institutional Research & Testing, 09/10

Statistics

	N				
	Valid	Missing	Mean	Median	Std. Deviation
q1.a The MFGT program is consistent with the mission of FSU	3	0	3.67	4.00	.577
q1.b The programs are guided by an effective advisory board	3	0	3.33	3.00	.577
q1.c The quality of the MFGT program compares favorably with similar programs around the country	3	0	4.00	4.00	.000
q1.d Instructional content reflects what is needed to be successful in today's workplace	3	0	3.67	4.00	.577
q1.e Program faculty possesses knowledge of current practices	3	0	4.00	4.00	.000
q1.f Program faculty teaches current practices	3	0	3.67	4.00	.577
q1.g Program faculty provides students with appropriate classroom activities	3	0	3.67	4.00	.577
q1.h Program faculty has good rapport with students	3	0	4.33	4.00	.577
q1.i Program faculty provides students with appropriate academic advising	3	0	4.33	4.00	.577
q1.j Program faculty provides students with appropriate advising about career planning/placement	3	0	4.67	5.00	.577
q1.k The Ferris State University administration supports the MFGT program	3	0	3.00	3.00	1.000
q1.l The current operating budget is sufficient to meet program needs	3	0	3.00	2.00	1.732
q1.m The number of qualified tenure-track faculty is sufficient to meet program needs	3	0	2.67	3.00	.577
q1.n The program has adequate resources allocated for coordination & administration	3	0	3.67	3.00	1.155
q1.o MFGT program students are well prepared to enter the workforce	3	0	4.00	4.00	.000
q1.p MFGT program prepares students to enter industry better than other schools	3	0	4.00	4.00	.000
q1.q MFGT program grads contribute as much as other grads in their first 6 months of employment	3	0	4.00	4.00	.000
q1.r MFGT program provides a foundation for multiple career possibilities	3	0	4.00	4.00	.000
q1.s Adequate placement assistance is provided to graduates	3	0	3.67	4.00	1.528
q1.t There are a number of varied internships available to students	3	0	3.33	3.00	.577

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing			
q1.u There are a number of high quality internships available to students	3	0	4.00	4.00	1.000
q1.v There are job opportunities available to Ferris State University MFGT program graduates	3	0	4.00	4.00	.000
q2 Qualities/skills (if any) do you feel are lacking in program grads	3	0			
q3 Strengths of program	3	0			
q4 Areas needing improvement	3	0			
q5 Comments/suggestions that would help better prepare future grads	3	0			
q6 Additional comments	3	0			

Frequency Table

q1.a The MFGT program is consistent with the mission of FSU

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	33.3	33.3	33.3
	Strongly Agree	2	66.7	66.7	100.0
	Total	3	100.0	100.0	

q1.b The programs are guided by an effective advisory board

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	66.7	66.7	66.7
	Strongly Agree	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q1.c The quality of the MFGT program compares favorably with similar programs around the country

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	3	100.0	100.0	100.0

q1.d Instructional content reflects what is needed to be successful in today's workplace

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	33.3	33.3	33.3
	Strongly Agree	2	66.7	66.7	100.0
	Total	3	100.0	100.0	

q1.e Program faculty possesses knowledge of current practices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	3	100.0	100.0	100.0

q1.f Program faculty teaches current practices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	33.3	33.3	33.3
	Strongly Agree	2	66.7	66.7	100.0
	Total	3	100.0	100.0	

q1.g Program faculty provides students with appropriate classroom activities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	33.3	33.3	33.3
	Strongly Agree	2	66.7	66.7	100.0
	Total	3	100.0	100.0	

q1.h Program faculty has good rapport with students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	2	66.7	66.7	66.7
	Don't Know	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q1.i Program faculty provides students with appropriate academic advising

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	2	66.7	66.7	66.7
	Don't Know	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q1.j Program faculty provides students with appropriate advising about career planning/placement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	1	33.3	33.3	33.3
	Don't Know	2	66.7	66.7	100.0
	Total	3	100.0	100.0	

q1.k The Ferris State University administration supports the MFGT program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	33.3	33.3	33.3
	Somewhat Agree	1	33.3	33.3	66.7
	Strongly Agree	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q1.l The current operating budget is sufficient to meet program needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	66.7	66.7	66.7
	Don't Know	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q1.m The number of qualified tenure-track faculty is sufficient to meet program needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	33.3	33.3	33.3
	Somewhat Agree	2	66.7	66.7	100.0
	Total	3	100.0	100.0	

q1.n The program has adequate resources allocated for coordination & administration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	66.7	66.7	66.7
	Don't Know	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q1.o MFGT program students are well prepared to enter the workforce

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	3	100.0	100.0	100.0

q1.p MFGT program prepares students to enter industry better than other schools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	3	100.0	100.0	100.0

q1.q MFGT program grads contribute as much as other grads in their first 6 months of employment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	3	100.0	100.0	100.0

q1.r MFGT program provides a foundation for multiple career possibilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	3	100.0	100.0	100.0

q1.s Adequate placement assistance is provided to graduates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	33.3	33.3	33.3
	Strongly Agree	1	33.3	33.3	66.7
	Don't Know	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q1.t There are a number of varied internships available to students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	66.7	66.7	66.7
	Strongly Agree	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q1.u There are a number of high quality internships available to students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	33.3	33.3	33.3
	Strongly Agree	1	33.3	33.3	66.7
	Don't Know	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q1.v There are job opportunities available to Ferris State University MFGT program graduates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	3	100.0	100.0	100.0

q2 Qualities/skills (if any) do you feel are lacking in program grads

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	66.7	66.7	66.7
	Nothing, they are prepaired for entry level positions.	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q3 Strengths of program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Graduates are able to enter the workforce prepared for employment with trasferable and workable skills.	1	33.3	33.3	33.3
	Students are taught the basics through to a higher technical skills required in industry.	1	33.3	33.3	66.7
	The hands on training students receive in the laboratory.	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q4 Areas needing improvement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Better equipment, more space for the lab, and more equipment manufactures willing to spend time and supply equipment on loan or lease.	1	33.3	33.3	33.3
	Encouraging students to look to eventually going on for the 4 year BS degree.	1	33.3	33.3	66.7
	Make sure their is an umderstanding of the employer needs as well as the students.	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q5 Comments/suggestions that would help better prepare future grads

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	33.3	33.3	33.3
	Continue to focus on the ever changing industries that students get hired into.	1	33.3	33.3	66.7
	Look for continued self development. Encourage students to pursue additional educational opportunities.	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

q6 Additional comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	33.3	33.3	33.3
	I would like to see the faculty use the advisory board more and capitalize on the skills of the members. A yearly meeting is fine, but I believe many members of the board are willing to do more to help the faculty. We are invited in for a yearly meeting, presented with a summary of what's going on, fed lunch, and sent off. It's hard to help the school if we're not informed on the needs of the program. Use your board. If the memebers don't respond when asked for help then remove them and find people who will. Don't use us only to fulfill the school's dictate to have a board. Make it a resource. Communicate and ask for help. Be it help with recruiting students or advising on issues concerning the academic or financial needs of the program. The faculty are the experts in teaching, your board can help making their job a little easier by helping with business and other non academic issues.	1	33.3	33.3	66.7
	This is a great program that when't through a down slide in the early 2000 years, but has rebounded to become a respected program.	1	33.3	33.3	100.0
	Total	3	100.0	100.0	

Appendix D

Other Program Review Documents

COLLEGE OF TECHNOLOGY
2005-2006 ADMINISTRATIVE PROGRAM REVIEW
Program: AAS Manufacturing Tooling Technology

Purpose of Administrative Program Review

1. to facilitate a process led by the deans and department heads/chairs to assess and evaluate programs under their supervision
2. to facilitate long term planning and recommendations to the VPAA
3. to collect and analyze information that will be useful in the University's accreditation efforts; Academic Program Review deliberation; and assessment.

Instructions: Please prepare a report following the outline below.

I. Program Assessment/Assessment of Student Learning

a) What are the program's learning outcomes?
To assess student success in meeting the expectations of the Manufacturing Tooling Technology
Program. Coursework to include long-term retention and demonstrated ability to apply program subject material.

b) What assessment measures are used, both direct and indirect?
Outcomes to be measured to achieve the goal:
   1. *Incoming freshperson students will take a curriculum pre-test in order to baseline their knowledge, comprehension, and skill prior to starting to program.*
   2. *Sophomores will take a curriculum post-test in the MFGT 221 course to measure the knowledge, comprehension and skill level that was obtained and retained.*
   3. *Job placement*

c) What is the assessment cycle for the program?
Annual.

d) What assessment data were collected in the past year?
1.Post-test scores, achievement levels
2. Pre vs. post-test scores indicate improvement

e) How have assessment data been used for programmatic or curricular change?
Results are reviewed by Department faculty and industrial advisory board. Emphasis and methodology to be changed as required.

II. Course Outcomes Assessment

a) Do all multi-sectioned courses have common outcomes? *Yes*
b) If not, how do you plan to address discrepancies?
c) How do individual course outcomes meet programmatic goals? *Each course addresses a particular body of knowledge that contributes to the program as a whole. All course are interrelated and cumulative in nature.*

III. Program Features

1. Advisory Board

a) Does the program have a board/committee? *Yes* When did it last meet? Dec. 2, 2005. When were new members last appointed? 2004. Appointed/reappointed at each annual *meeting*. *Next meeting scheduled for Spring, 2007.* What is the composition of the committee (how many alumni, workplace representatives, academic representatives, etc.) 1 alum. 9 workplace.
b) If no advisory board exists, please explain by what means faculty receive advice from employers and outside professionals to inform decisions within the program.
c) Has feedback from the Advisory Board affected programmatic or curricular change? *Yes*

2. Internships/Cooperative or Experiential Learning

a) Is an internship required or recommended? *No*
b) If the internship is only recommended, what percentage of majors elect the internship option?
c) What challenges does the program face in regard to internships? What is being done to address these concerns?
d) Do you seek feedback from internship supervisors?

If so, does that feedback affect pedagogical or curricular change?

3. On-Line Courses

a) Please list the web-based courses, both partial internet and fully online, offered last year. *N/A (fully). Web-assisted: MFGT 112, MFGT 122, MFGT 150, MFGT 212, MFGT 252, MFGE 312*
b) What challenges and/or opportunities has web-based instruction created? *Funding support for development.*
c) What faculty development opportunities have been encouraged/required in order to enhance web-based learning within the program? n/a How has student feedback been used to enhance course delivery?
d) Is there any plan to offer this program on-line? *No* If yes, what rationale is there to offer this program online?" (emerging market opportunity?, expand enrollment?, demand for niche program offering?, etc.)

4. Accreditation

a) Is the program accredited or certified? *No*
b) By whom?
c) When is the next review?
d) When is the self-study due?
e) How has the most recent accreditation review affected the program?

5. Student/Faculty Recognition

a) Have students within the program received any special recognition or achievement? *Skills USA competition, Hurco Ultimate Scholarship, Hurco Applications to Engineering Scholarship, SPE and Metal Flow Scholarships*

b) Have faculty within the program received any special recognition or achievement? *Exceptional Merit Grant*

6. **Student Engagement**

a) Is volunteerism and student engagement a structured part of the program? Student involvement in the Manufacturing Tooling Student Association is encouraged. FSTTA student group.

b) Does the program utilize service learning in the curriculum? *No*

c) Does the program participate in the American Democracy Project? *No*

Areas of Strength:

- *Graduate job placement 100%*
- *Faculty Experience and Expertise – A combined total of 90+ years of industrial experience*
- *Partnerships with industry*
- *Highest paid A.A.S. degree on campus*
- *Curriculum – 12 documented course curriculums*

Areas of Concern (and proposed actions to address them)

- *Facilities & Equipment*
  - *Minor Capital Expenditures*
  - *UAP / Action plans*
  - *Employers often seek to hire students after completion of freshman year*

Future Goals:

- *Upgrade lab equipment*
  - *On-going effort* ***(2004-2006 has seen substantial improvement in software, hardware, and facilities with more scheduled for 2007)***
- ***Curriculum is in the process of a major revamping to be completed and implemented by F07***
- *"Technology 2000" – Alternative delivery method of course curriculum and course material using multi-media*
  - *UAP/ Action plan to purchase laptops and projectors(completed)*

Other Recommendations:

- Faculty release time for student recruiting and to develop industrial partnerships to insure continuing contact and support from related industries.

Gary Ovans 12-11-06

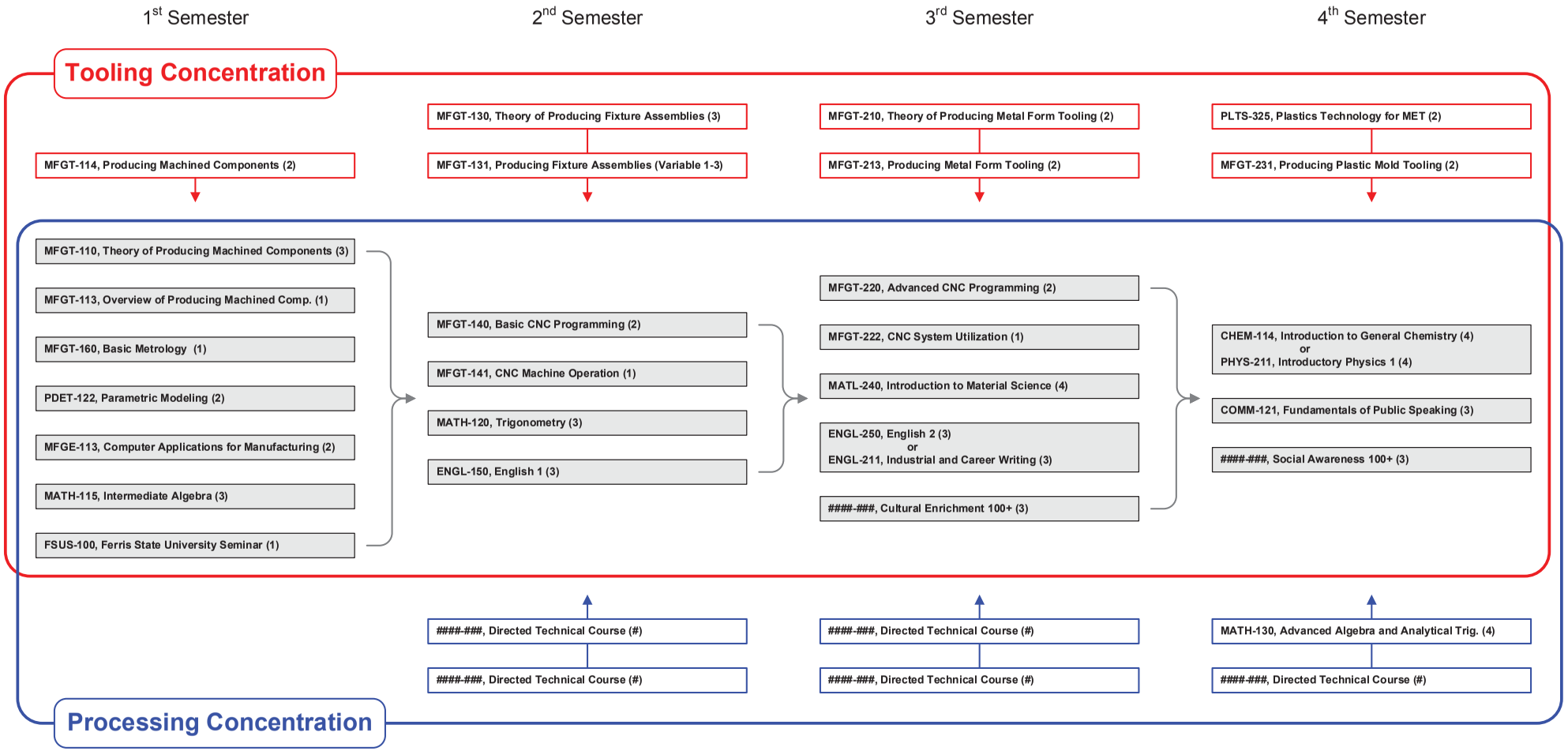
Department Chair Date

Appendix E
Curriculum Information

Ferris State University

Manufacturing Technology Associates Degree

Concentration System



FERRIS STATE UNIVERSITY
Imagine More

Associate in Applied Science

Manufacturing Technology

Tooling Technology Concentration
Course Sequence Guide

Student:			
Email:		ID:	
Advisor:		Ph:	

YEAR 1 - FALL SEMESTER			Crs	Gr	
MFGT	110	Theory of Producing Machined Components	3		
MFGT	113	Overview of Producing Machined Components (MFGT 110) [160 co-req]	1		
MFGT	114	Producing Machined Components (MFGT 110, 113) [160 co-req]	2		
MFGT	160	Basic Metrology	1		
PDET	122	Parametric Modeling	2		
MFGE	113	Computer Applications for Manufacturing	2		
MATH	115	Intermediate Algebra (ACT 19 or MATH 110)	3		
FSUS	100	FSU Seminar	1		
		Total	**15**		

YEAR 1 - SPRING SEMESTER			Crs	Gr	
MFGT	130	Theory of Producing Fixture Assemblies (MATH 115)	3		
MFGT	131	Producing Fixture Assemblies (MFGT 110, 113, 114, 160; PDET 122, MATH 115)	3		
MFGT	140	Basic CNC Programming (MFGT 110, 113, 160; PDET 122; MATH 115)	2		
MFGT	141	CNC Machine Operation (MFGT 110, 113, 160; PDET 122; MATH 115) [MFGT 140 co-req]	1		
MATH	120	Trigonometry (ACT 24 or C- in MATH 115)	3		
ENGL	150	English 1 (ACT 14 or ENGL 074)	3		
		Total	**15**		

Submit Application for Graduation.

YEAR 2 - FALL SEMESTER			Crs	Gr	
MFGT	210	Theory of Producing Metalform Tooling (MATH 115)	2		
MFGT	213	Producing Metalform Tooling (MFGT 130, 131, 140, 141) [MFGT 210 co-req]	2		
MFGT	220	Advanced CNC Programming (MFGT 140, 141)	2		
MFGT	222	CNC System Utilization (MFGT 140, 141; MFGT 220 co-req)	1		
MATL	240	Introduction to Material Science	4		
ENGL	250	English 2 (ENGL 150) OR	3		
ENGL	211	Industrial Career Writing (ENGL 150)			
		Cultural Enrichment	3		
		Total	**17**		

YEAR 2 - SPRING SEMESTER			Crs	Gr	
PLTS	325	Plastics Technology for MET	2		
MFGT	231	Producing Plastic Mold Tooling (MFGT 130, 131, 140, 141) [PLTS 325 co-req]	2		
CHEM	114	Intro to General Chemistry (ACT MATH 19 , CHEM 103 or H.S. Chemistry) OR	4		Preferred for B.S. MFGE
PHYS	211	Introductory Physics 1 (ACT MATH 25 or MATH 116 or 120)			Required for B.S. PDET
COMM	121	Fundamentals of Public Speaking	3		
MATH	130	Advanced Algebra & Analytical Trig (ACT 24 or MATH 120)			Required for MFGE/PDET
		Social Awareness	3		
		Total	**14**		

Contact the Manufacturing Program office
for more information
Phone: 231-591-2511
Email:Manufacturing Department@ferris.edu
www.ferris.edu/manufacturing

Fall 2010
6/27/2011

FERRIS STATE UNIVERSITY
Imagine More

Associate in Applied Science

Manufacturing Technology

Processing Technology Concentration
Course Sequence Guide

Student:			
Email:		ID:	
Advisor:		Ph:	

YEAR 1 - FALL SEMESTER			Crs	Gr	
MFGT	110	Theory of Producing Machined Components	3		
MFGT	113	Overview of Producing Machined Components (MFGT 110, 160 co-req)	1		
MFGT	160	Basic Metrology	1		
PDET	122	Parametric Modeling	2		
MFGE	113	Computer Applications for Manufacturing	2		
MATH	115	Intermediate Algebra (ACT19 or MATH 110)	3		
FSUS	100	FSU Seminar	1		
		Total	**13**		
YEAR 1 - SPRING SEMESTER			**Crs**	**Gr**	
		Directed Technical Course (See list on reverse side)	3		
		Directed Technical Course (See list on reverse side)	3		
MFGT	140	Basic CNC Programming (MFGT 110, 113, 160; PDET 122; MATH 115)	2		
MFGT	141	CNC Machine Operation (MFGT 110, 113, 160; PDET 122; MATH 115; MFGT 140 co-req)	1		
MATH	120	Trigonometry (ACT 24 or C- in MATH 115)	3		
ENGL	150	English 1 (ACT 14 or ENGL 074)	3		
		Total	**15**		

Submit Application for Graduation.

YEAR 2 - FALL SEMESTER			Crs	Gr	
		Directed Technical Course (See list on reverse side)	2		
		Directed Technical Course (See list on reverse side)	2		
MFGT	220	Advanced CNC Programming (MFGT 140, 141)	2		
MFGT	222	CNC System Utilization (MFGT 140, 141; MFGT 220 Co-req)	1		
MATL	240	Introduction to Material Science	4		
ENGL	250	English 2 (ENGL 150) OR	3		
ENGL	211	Industrial Career Writing (ENGL 150)			
		Cultural Enrichment	3		
		Total	**17**		
YEAR 2 - SPRING SEMESTER			**Crs**	**Gr**	
		Directed Technical Course (See list on reverse side)	2		
		Directed Technical Course (See list on reverse side)	2		
CHEM	114	Intro to General Chemistry (ACT MATH 19 , CHEM 103 or H.S. Chemistry, MATH 110) OR	4		Preferred for B.S. MFGE
PHYS	211	Introductory Physics 1 (ACT MATH 25 or MATH 116 or 120)			Required for B.S.PDET
COMM	121	Fundamentals of Public Speaking	3		
MATH	130	Advanced Algebra & Analytical Trig (ACT MATH 24 or MATH 120)	4		Required for MFGE/PDET
		Social Awareness	3		
		Total	**18**		

AAS Minimum General Education Requirements: Cultural Enrichment (CE) – 3 credits; Social Awareness (SA) - 3 credits; Communications - 6 credits; Scientific Understanding - 3/4 credits; Reference: http://www.ferris.edu/htmls/academics/gened/gen_edspecific.htm

Contact the Manufacturing Program office
for more information
Phone: 231-591-2511
Email:Manufacturing Department@ferris.edu
www.ferris.edu/manufacturing

Fall 2010
6/27/2011

Ferris State University
College of Engineering Technology
School of Design & Manufacturing

Course Syllabus

Course Title: MFGT-110, Theory of Producing Machined Components

Credit Hours: 3 Semester Hours

Contact Hours: 3 Hours/Week

Course Description:

In this course focus is placed on developing an in-depth understanding of the science and methodology used in producing machined components. This course covers process planning, speeds and feeds, an in-depth study of the core machining processes (i.e.: sawing, drilling, milling, turning, and grinding), indexable cutting tools, and metalworking fluids. Classroom discussions and related activities support the projects in the corresponding lab courses.

This course is for all Manufacturing Technology students (including articulating students), CNC certificate students, and students who minor in Manufacturing Technology.

Prerequisite: None

Corequisite: None

Textbook: Machine Tool Practices (Latest Edition)
Machinery's Handbook (Latest Edition)

Units of Instruction and Student Learning Goals for each Unit:

I. Introduction and Orientation

A. Understand the course format, attendance policy, grading scale, and project requirements.

II. Process Planning

A. Define and use related terminology.

B. Identify the departments within a manufacturing organization that contribute to process planning and summarize each department's contributions.
C. Describe the key elements of a successful process planning procedure.
D. Perform print reviews.
E. Identify and state the value of various types of process documentation including: flowcharts, process sheets, operation sheets, set up sheets, tooling layouts, standard operating procedures, work instructions, and inspection reports.
F. Create process sheets and inspection reports.
G. Utilize flowcharts, process sheets, set up sheets, standard operating procedures, and inspection reports.

III. Speeds and Feeds

A. Define and use related terminology.
B. Select cutting speeds and feeds from tool manufacturers charts.
C. Calculate spindle speed for various applications.
D. Calculate feed rate for high-engagement applications.
E. Calculate feed rate for low-engagement applications.

IV. Sawing Technology

A. Define and use related terminology.
B. Defend relative safety rules.
C. Identify the applications, limitations, and capabilities of various sawing machines including: vertical contour band saws, scissor-type horizontal band saws, double column horizontal band saws, cold saws, and abrasive cutoff saws.
D. Select sawing machines for specific applications.
E. Select saw blades for specific applications.

V. Drilling Technology

A. Define and use related terminology.
B. Defend relative safety rules.
C. Identify various drilling operations and state the purpose of each including: spot drilling, center drilling, drilling, chamfering, countersinking, counterboring, spot facing, reaming, and tapping.
D. Identify the applications, limitations, and capabilities of specialized hole drilling processes including: gun drilling, BTA-STS drilling, and ejector drilling.
E. Identify the applications, limitations, and capabilities of various drilling machines including: sensitive/upright drill presses, radial arm drill presses, multi-spindle drill presses, and CNC drills.
F. Select drilling machines for specific applications.

G. Select work holding devices for specific applications.
H. Select cutting tools and holders for specific applications.

VI. Milling Technology

A. Define and use related terminology.
B. Defend relative safety rules.
C. Identify various milling operations and state the purpose of each including: facing, edging, slotting, pocketing, contouring, plunging, thread milling, and boring.
D. Identify the applications, limitations, and capabilities of various milling machines including: knee-type vertical mills, bed-type vertical mills, bed-type horizontal mills, boring mills, and CNC mills.
E. Select milling machines for specific applications.
F. Select work holding devices for specific applications.
G. Select cutting tools and holders for specific applications.

VII. Turning Technology

A. Define and use related terminology.
B. Defend relative safety rules.
C. Identify various turning operations and state the purpose of each including: turning, facing, grooving, parting, profiling, knurling, threading, and boring.
D. Identify the applications, limitations, and capabilities of various turning machines including: engine/toolmakers lathes, turret lathes, vertical lathes, swiss-style lathes, multi-spindle lathes, and CNC lathes.
E. Select turning machines for specific applications.
F. Select work holding devices for specific applications.
G. Select cutting tools and holders for specific applications.

VIII. Grinding Technology

A. Define and use related terminology.
B. Defend relative safety rules.
C. Identify various grinding operations and state the purpose of each including: flat surface grinding, O.D. grinding, I.D. grinding, shoulder grinding, plunge grinding, and profile grinding.
D. Identify the applications, limitations, and capabilities of various grinding machines including: types-1,2,3, and 4 surface grinders, blanchard grinders, O.D. / I.D. grinders, cylindrical grinders, centerless grinders, jig grinders, and CNC grinders.
E. Select grinding machines for specific applications.
F. Select work holding devices for specific applications.
G. Select grinding wheels for specific applications.

IX. Indexable Cutting Tools

A. Define and use related terminology.
B. Identify various indexable cutting tools and state the purpose of each.
C. Interpret insert specifications.
D. Select indexable cutting tools for specific applications.
E. Identify primary insert failure modes.

X. Metalworking Fluids

A. Define and use related terminology.
B. Identify various cutting fluids and describe the properties of each.
C. Identify cutting fluid application methods and state the advantages and limitations of each.
D. Describe the key elements of successful fluid maintenance.
E. Identify cutting fluid filtering methods and state the advantages and limitations of each.
F. Select cutting fluids for specific applications.

Grading Scale:

95-100	=	A	80-82	=	C
93-94	=	A-	77-79	=	C-
91-92	=	B+	74-76	=	D+
88-90	=	B	71-73	=	D
85-87	=	B-	69-70	=	D-
83-84	=	C+	0-68	=	F

Appendix F

Faculty Information

David A. Borck

2792 4 Mile NW
Grand Rapids Mi 49544-9205
Home 616-784-0247

Summary

The wide variety of experiences I have received from my employment at Greenville Tool and Die, Western Michigan University, Indiana Vocational Technical College and Northwestern Michigan College qualifies me to teach in many areas.

Experience

2005-Present, Ferris State University- Big Rapids, Michigan

Taught a variety of classes for the Manufacturing Tooling Technology Program and the Manufacturing Engineering Program

1970-1974, 1980-2005, Greenville Tool and Die- Greenville, Michigan

My experiences have had a wide range at Greenville Tool & Die. I have been a special machinist, a die leader, die designer, CNC programmer, cad die designer, system manager, and computer programmer. I have been involved with training people on different controllers in the shop and on Computervision CADDS5 CAD CAM system Dassault's Catia V5 CAD CAM software in the engineering department.

I have worked with Fagor controllers on a CNC jig grinder, Charmilles Robofill 400 and 600 wire burn controller, Cincinnati 900 and 850 controllers and Okuma 5020 and 7000 controllers. Our latest Okuma mill also has multiple heads with it. My role with these has been to learn how to use them and then write training manuals and train new operators.

I have used Microsoft Office 97 products Word, Excel, Access and Power Point. I have worked on DOS, Windows 95, Windows 98, Windows NT and Unix operating systems. Programming software I have used includes Visual Basic, Borland's C++, CADDS5 CVMAC, Visual Dbase, Seagate's Crystal Reports along with older languages BASIC, Varpro and NewVar.

I did research on many topics from new machines too new machining methods, new cutters, die designs, and new software.

1979-1980, Northwestern Michigan College- Traverse City, Michigan

Taught machine shop classes and related classes.

1975-1979, Indiana Vocational Technical College- Muncie, Indiana

At IVTC I was Program Advisor of the Machine Tool Department. I was in charge of counseling and scheduling of our students. I also hired part time instructors as needed plus taught machine shop and related classes. I repaired the majority of machines. When I arrived at IVTC there were 40 students enrolled in the program when I left we had over one

hundred. The last two years in Indiana I was Chairman for the State Wide Curriculum Committee for Machine Tooling.

1973-1975, Western Michigan University- Kalamazoo, Michigan.

I worked as a Teaching Graduate Assistant and Part-time Instructor while working on my master's degree. I taught classes such as basic machining, die making and production tooling.

Education

August 1978	Western Michigan University- Kalamazoo, Michigan Master of Arts degree in Teaching Industrial Education
November 1974	Ferris State College- Big Rapids, Michigan Bachelor of Science degree in Trade-Technical Education
March 1970	Ferris State College- Big Rapids, Michigan Associate in Applied Science degree in Machine Tool

Also have attended many seminars and training sessions on Catia and Pro-e

Interests

Running, motorcycles, skiing, boating, camping and cooking are some of the varied avocation interests I involve myself in.

References

Promptly furnished upon request.

Personal Portfolio

(Modified from the CET Post-Tenure Portfolio)

Dean R. Krager
Associate Professor
Manufacturing Technology
School of Design and Manufacturing

Industrial Work Experience

Manufacturing Engineer

Newcor, Rochester Gear- Clifford, MI

March 1998 - August 1999

- Managed the development and launch of new manufacturing cells.
- Researched, ordered, ran-off, and implemented manufacturing equipment including: machining, gaging, and material handling equipment.
- Performed tool testing for high-precision machining operations.
- Designed and sourced special workholding fixtures and custom indexable tools.
- Evaluated current processes and established long-term goals.
- Researched, developed, and implemented new processes including: hard turning and dry machining.

Manufacturing Engineer

Orbital Fluid Technologies/Synerject- Saginaw, MI

June 1995 - March 1998

- Reviewed product designs for manufacturability and specified process prints.
- Developed process documentation including: process prints, flow charts, setup sheets, control plans, and FMEA's.
- Researched, ordered, ran-off and implemented manufacturing equipment including: machining, gaging, assembly, and test equipment.
- Evaluated future product designs and specified manufacturing requirements including: processes, equipment, capital, floor space, and personnel requirements.

Machinist/Tool Builder

R&S Tool & Die- Caro, MI

May - September, 1994

- Machined and inspected close-tolerance die details and special gages.
- Manufactured prototype parts from a wide variety of materials.
- Produced fixture assemblies and assisted in building special machines.

Tool Designer/Tool Builder

Thumb Group, Gemini Plastics & Lyntex Manufacturing- Ubly, MI

May - September, 1991, 1992, & 1993

- Designed and assisted in building injection molds, blow molds, and fabrication dies.
- Developed gaging and fixturing prints from 3-D CAD models.
- Evaluated, debugged, and programmed an NC replicator.

Mechanical Draftsman

Nortec Precision Plastics- Bad Axe, MI
September 1988 - June 1989

- Developed layout prints for quality assurance.
- Designed gages and CMM fixtures for injection molded parts.

Previous Teaching Experience

Technical Instructor

In addition to the hands-on industrial work experience previously listed, a combination of the following instructional work experience was part of both Manufacturing Engineer positions:

- Taught Basic Machining and Process Documentation classes to new production operators.
- Provided update training to experienced operators and maintenance staff when implementing new equipment and tooling.
- Taught G-code programming to new manufacturing technicians.

Technical Instructor

Ferris State University: College of Technology- Big Rapids, MI
September 1994 - May 1995

- Taught Introduction to CAD, Basic Machine Tools, and Advanced Machine Tools.
- Developed all quizzes, tests, and final exams for all courses.
- Compiled academic warnings and grades.
- Setup, evaluated, and integrated a new wire EDM programming package.
- Rewrote an NC post-processor to correspond with a wire EDM.

Student Teacher

Wexford Missaukee Technical Center- Cadillac, MI
March - May 1993

- Taught Mechanical Drafting using both manual equipment and Autocad.
- Provided group and individualized instruction for a combination of traditional and non-traditional students.
- Assisted in the development of new instructional materials.
- Compiled student evaluations and met with students parents during parent-teacher conferences.

FSU Teaching Experience

Programs:

Manufacturing Technology
Manufacturing Engineering Technology

Courses Taught:

MFGE-312, CNC and CAM
MFGE-324, Principles of Process Planning I (formerly Tool Engineering)
MFGT-110, Theory of Producing Machined Components
MFGT-111, Machine Tool Operations I
MFGT-113, Overview of Producing Machined Components
MFGT-114, Producing Machined Components
MFGT-121, Machine Tool Operations II
MFGT-122, CNC Manual Part Programming
MFGT-131, Producing Fixture Assemblies
MFGT-150, Basic Machine Tools
MFGT-212, CAD / CAM for CNC Machinery
MFGT-221, Plastic Mold Construction
MFGT-252, Advanced Machine Tools

Courses Developed:

MFGT-110, Theory of Producing Machined Components
MFGT-113, Overview of Producing Machined Components
MFGT-114, Producing Machined Components
MFGT-130, Theory of Producing Fixture Assemblies*
MFGT-131, Producing Fixture Assemblies*
MFGT-140, Basic CNC Programming*
MFGT-141, CNC Machine Operation*
MFGT-160, Basic Metrology*
MFGT-220, Advanced CNC Programming*
MFGT-222, CNC System Utilization*
MFGT-231, Producing Plastic Mold Tooling*

Note: An asterisk (*) identifies courses developed as a team effort between another faculty member and myself.

Seminars, Workshops, Etc.:

"The Effects of Design on Producing Precision Machined Components"

This 2-3 day workshop is the result of personal consulting. Approximately 3 years ago I was approached by the Society of Manufacturing Engineers to develop a machining overview course to provide a review of machining capabilities and associated costs for mechanical and design engineers. After working through a needs analysis with Kulick and Soffa Industries (KNS) of Philadelphia, PA, this course evolved into an immersive workshop involving an overview of core machining operations as well as an in-depth team-based review of company specific components. The workshop is dynamic in that the team-based review of company specific components can be adjusted from one to two days depending on what the company wishes to accomplish.

I have presented this workshop on three occasions for KNS. Twice at the companies world headquarters in Philadelphia where they design and test specialized machines used in the production of microchips and once in Singapore at their manufacturing facility. Class size ranged from 12 to 25 engineers per workshop.

Although I've received additional interest in this workshop from other companies, I decided to put my personal consulting on hold until some long-awaited changes have been implemented in the Manufacturing Technology program.

"The Fundamentals of CNC Milling"

This course is designed to provide a well-rounded educational experience for individuals working with production-type CNC milling applications. Focus is placed on developing an understanding of the science and methodology involved in producing machined components using CNC machining centers. This course covers process planning, work holding systems, cutting tools and holders, speeds and feeds, coordinate data input, EIA coding systems, G-code program development, program verification / simulation, machine startup, and machine operation. Class discussions and related activities reference the company's actual components and equipment.

This 20 hour course is the result of personal consulting. It was originally developed for implementation at Simonds Industries in Big Rapids, MI.; however, as a result of both changes in management and corporate finances its implementation has been delayed.

Recent Related Work Experience

During the past five years I've committed the majority of my time outside the classroom to the continued development of the Manufacturing Technology program affording little time to work in industry. The following experiences represent my personal consulting activities since my last promotion.

5/25/05 Facilitated a 2-day technical workshop titled "The Effects of Design on Producing Precision Machined Components" to a group of 12 mechanical/design engineers at Kulick and Soffa Industries in Philadelphia, PA. In conjunction with this workshop I performed a complete DMA print review, process analysis, and identified potential corrective actions for several of the companies "problematic" components.

7/26/05 Presented the "Effects of Design …." technical workshop to a group of 15 mechanical/design engineers at Kulick and Soffa Industries in Philadelphia, PA.

10/7/05 Proctored a Michigan Occupational Competency Assessment certification exam through Occupational Research Associates in Big Rapids, MI.

1/4/06 Presented the "Effects of Design …." technical workshop to a group of 25 mechanical/design engineers at Kulick and Soffa Industries in Singapore.

5/9/06 Proctored a Michigan Occupational Competency Assessment certification exam through Occupational Research Associates in Big Rapids, MI.

12/8/06 Proctored a Michigan Occupational Competency Assessment certification exam through Occupational Research Associates in Big Rapids, MI.

Recent Educational Experience

Non-Credit Coursework:

6/6/05	MasterCam Mill Level-3 Programming,	40 Hours
2/21/06	Hurco Lathe Programming with WinMax,	24 Hours
5/8/06	Fast Track to Pro/ENGINEER Wildfire 3.0,	40 Hours
7/23/07	Catia V5: Introduction to Modeling,	40 Hours
8/23/07	Catia V5: Introduction to Prismatic Machining,	16 Hours
2/12/08	Catia V5: Introduction to Surface Design,	16 Hours

Contributions to Ferris Beyond Teaching

Program Responsibilities:

- Serving as the coordinator of strategic planning. This includes scheduling and facilitating planning meetings, documenting an annual strategic plan, and compiling an annual development report.

- Serving as the program articulation specialist. This includes reviewing articulation agreements and researching articulation options. Currently working on redefining all first-semester projects to so as to create new, more simplified course articulation requirements.

- Working to further develop industrial partnerships and advance the financial status of programs by negotiating major discounts and donations. Over the past six years I've secured Gift-in-Kind contributions of over $100,000 in Equipment and Related Tooling and $185,000 in Software for a grand total of $285,000.

- Advising both MFGT and MFGE students.

Curriculum Development:

- Co-authored the 1st major curriculum action in 20 years. This action included: reducing the overall credit count from 68 credits to 64 credits; splitting six combined lecture/lab courses into separate lecture and lab courses; creating additional (lesser-credit) lab courses; replacing a traditional blueprint reading course with a 3-D solid modeling course; rebalancing the credit weight of CNC courses; renumbering all MFGT major courses; updating all course documentation. Combined, these changes have redefined the program and allow the program to better meet the needs and goals of all stakeholders.

- Co-authored the 2nd major curriculum action in 20 years. This action included: establishing a dual concentration associates degree in Manufacturing Technology; reducing the overall credit count from 64 credits to 61 credits; adjusting the credit weight of manufacturing lecture and lab courses; redefining course outcomes; and replacing a traditional handbook calculations course with an applied metrology course. Combined, these changes have significantly improved the operational efficiency of the program.

- Currently investigating developing two CNC certificate programs to provide condensed, summer sessions to regional manufacturing companies.

Committee Participation:

- College of Engineering Technology Sabbatical Committee, 2006 – Present
- College of Engineering Technology Scholarship Committee, 2005 – Present
- Dave Borck's Tenure Committee, 2004 – Present
- Hurco Scholarship Committee, 2005 – Present
- Manufacturing Technology APR Committee, 2003 – Present
- Manufacturing Technology Program Curriculum Committee, 1999 – Present
- Michigan EMIT Pathways Machine Tool Standards Committee, 2006 – 2008

Department Responsibilities:

- Providing marketing and recruitment services such as presentations, group tours, and off-site secondary program visits.

- Serving as the primary contact to several of our major industrial partners such as Hurco, Sandvik, and most MFGT advisory board members.

- Coordinating a variety of major trips including an annual trip to Indianapolis for Hurco's annual technology seminar and a bi-annual trip to Chicago for the International Manufacturing Technology Show.

- Serving as the technology co-advisor. This includes coordinating software and hardware upgrades and troubleshooting CAD/CAM software and CNC equipment.

- Serving as the cutting tool procurement and inventory specialist. This includes sourcing specialty and indexable cutting tools, creating master tool libraries and tracking tool inventory and usage.

- Serving as the coordinator of lab reorganization. This includes creating lab layouts in CAD, presenting layout options at meetings, and following-up with other miscellaneous lab development tasks.

Involvement in Student Activities:

- Advised the Ferris State Tooling Technologists Association from 2000 until the group was incorporated into SME in 2008.

- Assisting special project teams (Formula, Baja, etc.) with process troubleshooting and problem solving activities in regard to manufacturing vehicle components.

- Assisted the Formula SAE team in securing a $500 project scholarship from Hurco USA.

Involvement in Professional Organizations

Membership in Organizations:

- Michigan Machining Instructors Association, Member 2006 – Present
- N.O.C.T.I, Subject Area Expert / Consultant 2003 – Present
- Skills USA, Professional Member 2003 – 2007
- Society of Manufacturing Engineers, Member 1995 – Present

Innovative Educational Activities

Classroom / Lab Activities:

Spring-08 Incorporated an industrial development project into my MFGT-221, mold building lab. This project consisted of producing several prototype plastic injection molds for Dan McKeon, President of Bad Dog Security Systems in Traverse City, MI. During the semester, the project was carried out as a real-world tool build project including preliminary design reviews, weekly production/status meetings with Bad Dog Security, and regular milestones on which progress was assessed. The project provided students a chance to experience the whole process of tool engineering from design through prototype run. As a result of this project I began engineering a more-modular mold building system that will better incorporate industrial best practices, increase the operational efficiency of the course and lower course material costs.

Spring-09 Incorporated a community service project into my MFGE-324, process planning course. This project consisted of producing a low-volume run of specialized security nuts to be used by local businesses to better secure the embellished bulldogs from the recent "Leadership Mecosta" project. This project served as "Project-X", a preparatory project in process planning used to prepare students for the annual Amerikam project.

Spring-10 Currently working on incorporating another community service project into my MFGE-324, process planning course. This year's project will consist of producing a low-volume run of re-engineered stainless steel scraper blades for use in "The Rock" on the infamous Mongolian Grill.

Recent Publications and Presentations

Presentations:

11/12/04 Served as a guest speaker at the 2004 Ferris Foundation for Excellence Benefit Dinner in Grand Rapids.

11/8/06 Presented on “Careers in Manufacturing” to over 100 high-school students at the Huron Area Technical Center’s annual Career Day.

11/7/07 Presented on “Careers in Manufacturing” to over 100 high-school students at the Huron Area Technical Center’s annual Career Day.

11/3/08 Presented on “Careers in Manufacturing” to over 100 high-school students at the Huron Area Technical Center’s annual Career Day.

Recent Community Involvement

Community Service and Support:

- Central Michigan Search and Rescue, Training Officer 2006 – Present
- Osceola Emergency Management Support Team 2003 – Present

Louis J. Nemastil

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CAREER OBJECTIVE

University-level educator with comprehensive knowledge and experience in the Manufacturing Tooling Field that includes: engineering management, manufacturing system operations, tooling operations, tool design, die design, automation and systems development, stamping operations, steel fabrication, engineering and manufacturing operations, manufacturing processing including roll forming methods and operations.

PROFESSIONAL PROFILE

Certified Vocational Educator with a B.S. in trade/Technical Education, with a MS in Career / Technical Education. Offers 26 years of comprehensive engineering and administrative experience in the manufacturing tooling field, with emphasis on the design and development of progressive dies, sheet metal operations, statistical process control, and design of experiment, manufacturing lines, automation and fixture design. Effective tooling and jig/fixture construction. Well-developed interpersonal and communication skills enhanced by excellent technical abilities and well versed in the areas of industrial management and operations.

EDUCATION

M.S., Career and Technical Education, Ferris State University, Big Rapids, Michigan
B.S., Trade/Technical Education, Ferris State University, Big Rapids, Michigan
A.A.S., Machine Tool, Ferris State University, Big Rapids, Michigan
Certified Tool & Die Maker, Certified by: U.S. Department of Labor, Bureau of Apprenticeship & Training
Certified Vocational Education Instructor, Provisional Certification, and State of Michigan.
Certified for grades 9-12, Vocational Training, Provisional Certification, and State of Michigan.
Certified for grades 7-8 all subjects, Provisional Certification, State of Michigan.
Licensed Aircraft Pilot, Certified by: U.S. Federal Aviation Administration.

CONTINUING EDUCATION:

- ***Dale Carnegie Course***, Certificate of completion "Effective Speaking and Human Relations".
- ***Society of Manufacturing Engineers***, Certificate of completion, "Proven Design Principles and Applications of Progressive Dies"
- ***Society of Manufacturing Engineers***, Certificate of completion, "Estimating Processing for Stamping Dies".
- **Society of Manufacturing Engineers**, Certificate of Completion, "Progressive Dies".
- ***Superior Metal Products***, Certificate of completion, "Techniques of Problem Solving".
- ***Superior Metal Products***, Certificate of completion, "Statistical Process Control".
- ***Superior Metal Products***, Negotiation Completed "Win-Win" Negotiation training.
- ***Cad Design Systems,*** Certificate of completion, "CDSI AUTOCAD Operations".

CONTINUING EDUCATION:

- ***Grand Rapids Community College,*** Certificate of completion, "Geometric Tolerancing & Dimensioning".
- ***AGS, INC.,*** Certificate of completion, "Ground Instruction Federal Aviation Regulations".
- ***Axsys Incorporated,*** Certificate of completion, Master CAM IV
- ***Axsys Incorporated,*** Certificate of completion, Advanced Machining Master CAM IV
- ***PTC Incorporated*****,** Certificate of completion, Fast Track to Pro/ENGINEER Wildfire 2.0.
- ***PTC Incorporated*****,** Certificate of completion, Tool Operations Pro/ENGINEER Wildfire 2.0.
- ***Ferris State University,*** Completed, "MFGE Engineering Course CAD CAM".
- ***Catia/Delmia Incorporated,*** Certificate of completion, Catia Modeling.
- ***University of Milwaukee,*** Certificate of completion, Mold Tooling Operations
- ***Sandvik Inc,*** Certificate of completion, Cutting Tool Operations
- ***Ferris State University,*** Certificate of completion, Catia Parametric Modeling.
- ***Ferris State University,*** Certificate of completion, Catia Advanced Modeling.
- ***Ferris State University,*** Completed, "MFGT Tooling Course Advanced CNC Automation.

EMPLOYMENT HISTORY

Ferris State University, Big Rapids, Michigan ***1997-Present***

Associate Professor, Manufacturing Tooling Technology Program, College of Technology. Lead educator of for the following courses: MFGT 112 Machinery Handbook and Calculations, MFGT 160 Basic Metrology, MFGT 130 Theory of Producing Fixture Assemblies, MFGT 131 Producing Fixture Assemblies, MFGT 210 Theory of Producing Metal form Tool, MFGT 213 Producing Metalform Tooling, MFGT 252 Advanced Machine Tools, MFGE 321 Metrology, MFGE 352 Design for Manufacturing, MFGE 451 Plant Layout and Automation. Requires extensive content research and preparation; design curricula and create course modules and lessons for lecture and lab activities; effective teaching methods; team coordination; strong interpersonal and communication skills; solid decision making and problem-resolution skills; and constant updating of knowledge and technical skills.

Louis Nemastil, Consulting and Design Services, Hesperia, Michigan ***1995-Present***

Design and development of tooling systems, manufacturing systems, engineering operations, and training programs. Services are directed toward engineering and training activities, which include: tool design, tool processing, tool manufacturing, cost estimating, and program development. Clients consist of business owners, engineers, managers, team leaders, supervisors, and manufacturing facility personnel. Tool Design and training services are custom designed to enhance customer efficiency and productivity, including the ability to assess client needs, create course modules and lessons designed to meet individual customer requirements. Implementation of Microsoft Office software programs, (Word, Excel, PowerPoint), and strong English communication and customer service skills. Technical training and manufacturing plant experience.

Superior Metal Products, Corporate Tooling Division, Spring Lake, Michigan ***1984-1997***

Design engineer, engineering administrator, and production coordinator with complete engineering capabilities. Responsible and accountable for ensuring the smooth day-to-day operations in all areas of engineering for twelve corporate divisions, including prototype development, manufacturing systems planning, troubleshooting, budgeting, quoting, and cost estimating. Emphasis on the design and development, from concept to implementation, of complete manufacturing lines using proper engineering methods and standards. Participated in Design of Experiments for product development and processes. Key player in initiating and maintaining corporate computer system. Functions as consultant and troubleshooting for twelve corporate divisions nationwide. Scope of responsibility and accountability increased greatly in final years.

Bendix/Warner & Swasey Research Division, Solon, Ohio ***1981-1984***

Manufacturing, design, and testing of all prototype tooling equipment for manufacturing operations.

Reed City Tool & Die, Reed City, Michigan ***1980-1981***

Tool & Die Construction for plastic injection molding systems. Implemented theoretical knowledge into practical application.

IEM Corporation, Rogers Heights, Michigan ***1980***

Tooling Operations and Machining, Fabrication.

ACCOMPLISHMENTS AND AFFILIATIONS

- Graduate Studies; Highest Distinction; Ferris State University, Big Rapids, Michigan.
- President, St. Michael's School Board, Grand Rapids Diocese affiliation. Responsible for setting agendas; conducting meetings; setting budgets; coordinating and implementing programs and policies; motivating and encouraging in a proactive management style.
- Mechanical Advisor for Science Olympia, St. Michael School, Fremont, Michigan.
- Administration of grant monies, St Michael School, Fremont Michigan.
- Established educational program involving business skills directed toward enhancing math and science curriculum. Grant monies obtained through the Fremont area foundation, Fremont Michigan.
- Served on the Curriculum Committee for the Manufacturing Department, Ferris State University, Big Rapids, and Michigan.
- Founder and Chairperson of the Annual Giving Campaign for twelve years, Saint Michael School, Fremont Michigan. Total Endowment raised during my tenure $480,000.00
- Served on the Associate Deans Search Committee for the College of Technology, Ferris State University, Big Rapids, and Michigan.
- Served on the Conduct Review Committee: (CRC) in Judicial Services. Served as representative for the College of Technology, Ferris State University, Big Rapids, and Michigan.
- Served on the search committee for a tenure track position for the Manufacturing Tooling Technology Program, Ferris State University, Big Rapids, and Michigan.
- Author of reorganization plan for the Grand Rapids Diocese, Grand Rapids, Michigan. Implementation of School organizational and operational plan.
- Mentoring Appointment for the Manufacturing Tooling Technology tenure track faculty, Ferris State University, Big Rapids, Michigan.
- Served on The Manufacturing Tooling Technology Program Review committee, Ferris State University, Big Rapids, Michigan.
- Co-Contributor and Research Coordinator for the Hesperia Master Plan Committee. Appointed by the Hesperia Village Council to serve on the planning committee. Hesperia Master Plan Committee, Hesperia, MI.
- Elected Village Trustee for the Village of Hesperia, Hesperia Michigan. Serving a four year term on the village council, 2009-2013.

COMPUTER / SOFTWARE APPLICATIONS

- Microsoft Office: 2007
- AutoCAD: Version 2007
- Pro Engineer: Wildfire IV Design & Manufacturing.
- Master Cam: V9 Manufacturing
- Master Cam: V10 Manufacturing
- CATIA: VR19 Parametric Design
- CATIA: VR19 Manufacturing
- Electronic Library Fabrication and Tooling Operations

Appendix G

Advisory Committee Information

MFGT Advisory Committee Membership List, 2009

Karen Spaulding
Senior Recruiter
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Dave Borck, MFGT Faculty

Doug Chase, MFGT Faculty

Dennis Finney, MFGT Faculty

Dean Krager, MFGT Faculty

Lou Nemastil, MFGT Faculty

Gary Ovans, Manufacturing Coordinator

Sandy Morningstar, Manufacturing Secretary

Karen Lerew, CET Advancement Officer

Ron McKean, CET Associate Dean

Appendix H

MFGT Degree Program Costing Information

Ferris State University
Degree Program Costing 2007- 2008 (Summer, Fall, and Spring)

College : College of Technology
Department : Manufacturing Eng Tech

Program Name: Manufacturing Tooling Technology AAS

Program Credits Required (Total credits to graduate) 69

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$423.74
**Department Cost per Student Credit Hour	$32.88
***Dean's Cost per Student Credit Hour	$9.71
Total Cost per Student Credit Hour (Average for program)	**$466.33**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$29,238.13
Total Program Department Cost	$2,268.39
Total Program Dean's Cost	$669.94

Total Program Cost (Assumes a student will complete program in one year) $32,176.46

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
CDTD150	N	$20,339,457	$3,911,112	$2,143,941	122577	$166	$32	$17	2	$332	$64	$35
CULTELE	E	$2,675,583	$291,797	$155,186	21264	$126	$14	$7	3	$377	$41	$22
ENGL150	L	$723,614	$74,757	$42,087	5784	$125	$13	$7	3	$375	$39	$22
ENGL250	L	$594,421	$57,967	$32,635	4485	$133	$13	$7	3	$398	$39	$22
FSUS100	L	$164,174	$153,034	$176,548	1527	$108	$100	$116	1	$108	$100	$116
MATH116	L	$140,607	$5,840	$9,663	1328	$106	$4	$7	4	$424	$18	$29
MATL240	L	$111,511	$28,581	$5,715	720	$155	$40	$8	4	$620	$159	$32
MFGT111	L	$54,022	$2,223	$444	56	$965	$40	$8	8	$7,717	$318	$63
MFGT112	L	$14,827	$953	$190	24	$618	$40	$8	3	$1,853	$119	$24
MFGT121	L	$33,934	$2,223	$444	56	$606	$40	$8	8	$4,848	$318	$63
MFGT122	L	$19,769	$1,270	$254	32	$618	$40	$8	4	$2,471	$159	$32
MFGT211	L	$37,328	$5,081	$1,016	128	$292	$40	$8	8	$2,333	$318	$63
MFGT212	L	$21,826	$2,382	$476	60	$364	$40	$8	4	$1,455	$159	$32
MFGT221	L	$85,768	$5,081	$1,016	128	$670	$40	$8	8	$5,361	$318	$63
SCIUELE	E	$3,713,452	$755,669	$256,811	35293	$105	$21	$7	3	$316	$64	$22
SOCAELE	E	$1,886,041	$285,747	$223,491	22494	$84	$13	$10	3	$252	$38	$30

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course
** Department Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

Source: Office of Institutional Research, g:\...\progcost\0708\progcost.rsl