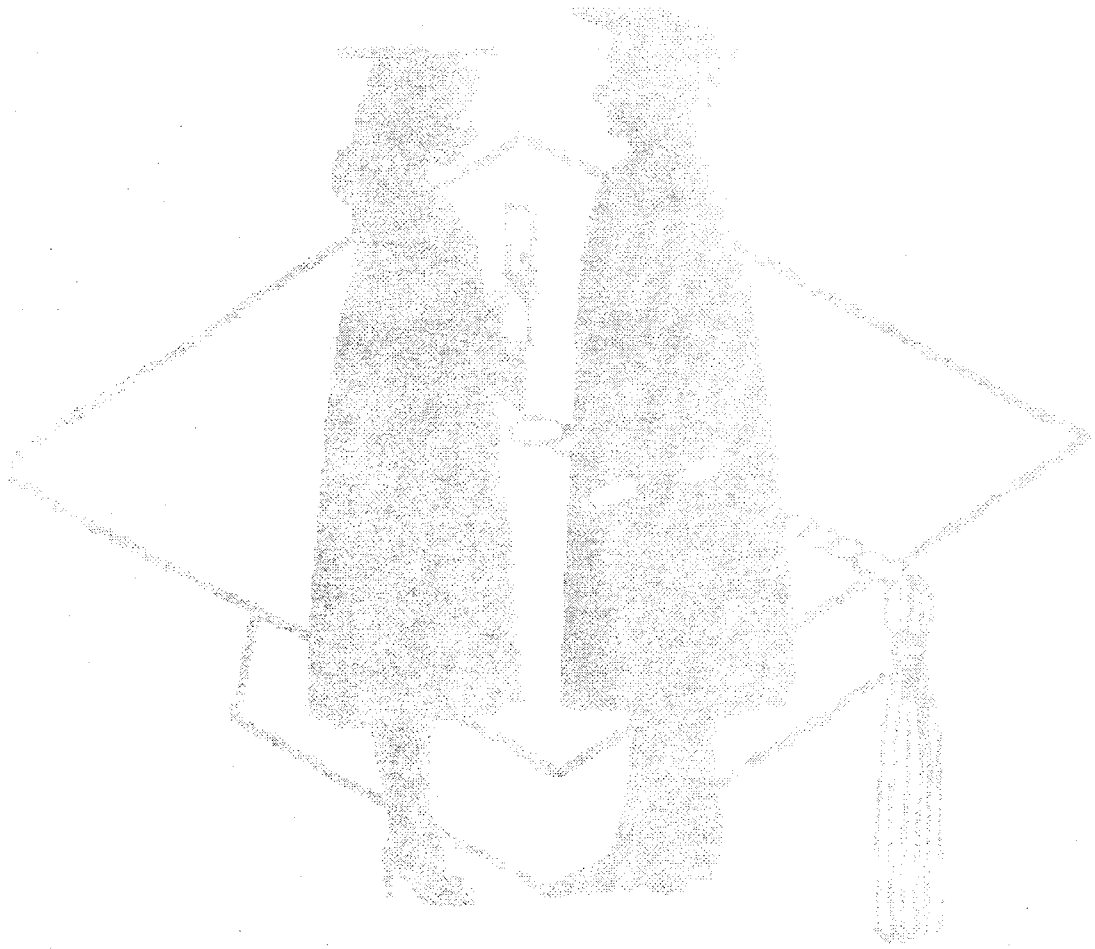
SELF STUDY FOR
ACADEMIC PROGRAM REVIEW

MANUFACTURING TOOLING TECHNOLOGY PROGRAM

ASSOCIATE IN APPLIED SCIENCE DEGREE

COLLEGE OF TECHNOLOGY
FERRIS STATE UNIVERSITY
BIG RAPIDS, MICHIGAN 49307

SEPTEMBER 15, 1998



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PROGRAM REVIEW PANEL

PROGRAM FACULTY

DENNIS FINNEY,
ASSOCIATE PROFESSOR, MANUFACTURING TOOLING TECHNOLOGY

JACK GREGORY, PRP CHAIR
ASSOCIATE PROFESSOR, MANUFACTURING TOOLING TECHNOLOGY

LOUIS NEMASTIL,
ASSISTANT PROFESSOR, MANUFACTURING TOOLING TECHNOLOGY

PAUL DRIGGERS,
TECHNICAL INSTRUCTOR, MANUFACTURING TOOLING TECHNOLOGY

INDUSTRIAL PARTICIPANT

JOHN MACMILLAN,
MANUFACTURING OPERATIONS MANAGER, ILLINOIS TOOL WORKS (ITW)

FACULTY OUTSIDE C.O.T.

DR. KATHERINE MANLEY,
CENTER OF OCCUPATIONAL EDUCATION

DRAWFORM

March 20, 1995

Governor John Engler
Governor of Michigan
Olds Plaza Building
111 South Capital Avenue
Lansing, MI 48933

Ref: Skilled Trades Training
in Michigan

Dear Governor Engler:

Over the past four years, your programs have been a major contributing factor in making Michigan the best manufacturing-based state in the country.

A major concern of myself and many other West Michigan CEO's is the lack of skilled trades including toolmakers, mold makers, design engineers, electronics technicians, CNC programmers, etc. West Michigan is a hot bed for new, high technology manufacturing and can surely grow beyond where it is today if our flow of skilled trades increases, not decreases.

Ferris State University has been a major recruiting school for the above trades for Drawform, Prince Corporation and many other high technology, manufacturing-based companies of West Michigan. Ferris State University is one bright spot for manufacturing tooling technology and should be promoted nationwide as the continued provider of skilled trades. This truly is a national model program.

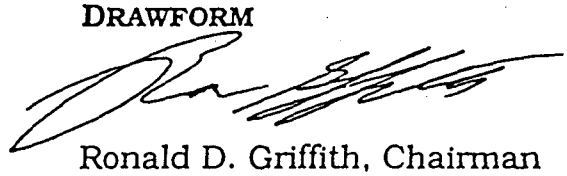
I personally have gone through German manufacturing plants studying their apprenticeship programs, and I will be going to Singapore, Hong Kong, and Mainland China in April to study their process with a group of concerned business CEO's that are trying to get kids involved in these trades. Toolmakers in our plant and others in Western Michigan are making $40,000 - $60,000 per year after a successful program out of Ferris and Drawform's apprenticeship program.

Let's promote our jewels and increase the skilled trades workforce. The manufacturing base that is already here in Michigan should be the heart beat of America - not the service jobs that seem to always take higher priority.

Any help you can give to Ferris State University's President and staff in promoting their programs will be much appreciated from all of us here in West Michigan. We thank you for listening.

Sincerely,

DRAWFORM



Ronald D. Griffith, Chairman
Chief Executive Officer

RDG/la

cc: Roger Blauwkamp, CEO, STM Manufacturing
Kerm Campbell, CEO, Herman Miller Inc.
Patrick Thompson, CEO, Trans-Matic Manufacturing
Don Heeringa, CEO, Trendway Corporation
John Spoelhof, President, Prince Corporation

Enclosure

ADMINISTRATIVE PROGRAM REVIEW

Program/Department: Pre-Manufacturing Tooling / Manufacturing Tooling Technology / DMGA

Date Submitted: November 15, 1997 Dean: Mark Curtis

Please provide the following information:

Enrollment/Personnel

	Fall 1992	Fall 1993	Fall 1994	Fall 1995	Fall 1996	Fall 1997
Tenure Track FTE	N/A	4.82	4.68	4.37	5.25	5.30
Overload/Supplemental FTEF	N/A	N/A	N/A	N/A	N/A	N/A
Adjunct/Clinical FTEF (unpaid)	N/A	N/A	N/A	N/A	N/A	N/A
Enrollment on-campus Total*	0/62	1/42	2/27	3/36	3/62	0/68
Freshman	0/22	1/16	2/8	2/23	3/39	0/39
Sophomore	0/26	0/18	0/12	1/6	0/23	0/29
Junior	0/11	0/5	0/5	0/5	0/0	0/0
Senior	0/3	0/3	0/2	0/2	0/0	0/0
Masters	N/A	N/A	N/A	N/A	N/A	N/A
Doctoral	N/A	N/A	N/A	N/A	N/A	N/A
Enrollment off-campus*	4	3	0	0	0	0

*Use official count (7-day count for semesters, 5-day count for quarters).

Financial

Expenditures	FY92	FY93	FY94	FY95	FY96	FY97
Supply & Expense	$20,666	$20,266	$17,995	$13,368	$17,508	$26,994
Equipment	N/A	N/A	N/A	N/A	N/A	N/A
NRG's	N/A	N/A	N/A	N/A	N/A	$113,589
Gifts & Grants	$92,482	$29,689	$55,795	$79,203	$113,759	$131,849

*Use end of fiscal year expenditures.

Other

	AY 92-93	AY 92-93	AY 93-94	AY 94-95	AY 95-96	AY 96-97
Number of Graduates * - Total	20	29	19	12	7	9
- On campus	20	29	19	12	7	9
-Off campus	0	0	0	0	0	0
Placement of Graduates	20	29	19	12	7	9
Average Salary	$17,773	$18,527	N/A	$25,155	$27,200	28,118
Productivity-Academic Year Average	N/A	N/A	323	313	268	315
-Summer	N/A	N/A	0	85	0	0
Summer Enrollment	0/3	N/A	0/2	1/2	0/0	3/0

*Use total for academic year (F,W,S)

Pre-Manufacturing Tooling/Manufacturing Tooling Technology

1. A. Areas of strengths:

- The Manufacturing Tooling Technology program has a consistently high placement rate.
- The program has strong industrial support through financial and equipment donations.
- The program contains state-of-the-art manufacturing processing equipment, as well as a high degree of hands-on training.

B. Areas of concern:

- Recruiting new freshmen.
- Replacement of capital equipment.
- Shortage of qualified faculty.
- Loss of Vocational Education funds.

2. Future goals:

	Time Frame
• Strong faculty recruiting efforts.	Continuous
• Convert full-time temporary position to tenure-track position.	Fall, 1998
• Add one new tenure-track position to cover demand for MFGT and Rubber Engineering Technology.	Fall, 1998
• Secure for a capital equipment replacement budget.	Continuous

3. Recommendations:

- The Manufacturing Tooling Technology program's recruiting plan has been very successful. This is an excellent program with a bright future, based upon the forecasted shortage of qualified toolmakers.

Sources:
1) Ferris Fact Book (Institutional Studies Office).
2) Placement Office Annual Report (Placement Office).
3) Ferris Productivity Report (Institutional Studies Office).
4) Student Information Systems.
5) Program Area Faculty.

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

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COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Program Profile

Programs: Manufacturing Tooling Technology
Degrees: A.A.S.
Department: Design, Manufacturing, and Graphic Arts
College: College of Technology

I. Purpose of the program

A. Describe the goals and objectives of the program (refer to role and mission statement of the program).

Manufacturing Tooling Technology
Mission / Role Statement

"The Manufacturing Tooling Technology program is committed to excellence in teaching and learning for all students. We will provide effective instructional leadership, responsible fiscal management, and a quality learning environment, which improve student outcomes. The MFGT program holds high expectations for students in the precision metalworking, tool and die making, and moldmaking manufacturing process. The Manufacturing Tooling Technology faculty are determined to provide its student body with a program designed to challenge and develop the technical skills necessary for the graduates to succeed in a rapidly changing industry."

- Accommodate nontraditional and transfer students working toward obtaining technology degrees.
- Provide students with quality education enabling them to enter third year apprenticeship programs or continue their education in one of the many baccalaureate degree programs.
- Maintain a current manufacturing tooling facility that reflects the current state of the industry.
- Encourage good work ethics and professionalism by continued exposure to modern manufacturing techniques and facilities.
- Promote faculty development through participation in graduate activities, workshops, and seminars.
- To maintain a balance of general education courses, to insure communication skills, both verbally and written, computational skills, social awareness, and cultural enrichment.

The Manufacturing Tooling Technology degree is designed to prepare students to enter industry, trained to build tooling, machine components, support engineering and manufacturing activities and to provide them with the technical foundation required in the Manufacturing Tool Technology field.

B. How is the program compatible with the role and mission statement of FSU?

The program is compatible with the University mission by providing hands-on, laboratory based career education and training.

C. How is the program integrated/coordinated with other programs at FSU?

In addition to serving its majors, the Manufacturing Tooling Technology program provides courses for Plastics Technology , Technical Drafting and Tool Design, Welding Technology, Manufacturing Engineering Technology, Product Design Engineering Technology, and Mechanical Engineering Technology majors. **See Attachment 1, Appendix A**

Manufacturing Tooling Technology Resource Utilization Chart.

D. How is the program integrated/coordinated with programs at other institutions?

The Manufacturing Tooling Technology program accepts transfers from community colleges in/outside Michigan. During the past ten years, numerous colleges have transferred students into the program.

The Manufacturing Tooling Technology Program has articulation agreements with community colleges, career tech centers, and high schools within the states of Michigan, Indiana, and Ohio.

E. How does the program serve society at the community, state, nation, and world?

The Manufacturing Tooling Technology program is one of the top ranked programs in the state. One hundred percent of employed graduates are working in positions directly related to their major field of study, with the majority working in Michigan. MFGT alumni have one of the highest average salaries of all two-year programs at Ferris. The 1998 survey shows that the average starting salary for the MFGT graduates is approximately $27,200/yr. In 1996 the Bureau of Labor and Statistics reported from a 1994 survey, that Ferris State University Manufacturing Tooling Technology graduates starting wages fall within the top ten percent on a national scale. **See Attachment 2, Appendix A**

Department of Labor Statistics Chart.

The Manufacturing Tooling Technology Program has assisted many programs and organizations within this university and the community, which include: Heavy Equipment Service Engineering Technology , Automotive Technology, Printing Management; university departments which include: Food Service, Plumbing and Physical Plant, Play Scape and Habitat for Humanity.

II. Resources of the program

A. Personnel

1. *Faculty: List by rank with degrees (including year, field of study and institution, certificates, and/or related work experience.* **See Attachment 3, Appendix A Faculty and Staff Resumes**

a. Faculty-Tenured

1. Dennis Finney, Associate Professor, 1985
   M.S. Industrial Education, Eastern Michigan University
   M.S. Occupational Education, Eastern Michigan University
   B.S. Trade and Technical Education, Ferris State University
   A.A.S. Manufacturing Tooling Technology, Ferris State University

2. Jack Gregory, Associate Professor, 1990
   M.S. Occupational Education, Ferris State University
   B.S. Manufacturing Engineering Technology, Ferris State University
   A.A.S. Manufacturing Tooling Technology, Ferris State University

b. Tenure-track

Louis Nemastil, Assistant Professor, 1997
B.S. Trade and Technical Education, Ferris State University
A.A.S. Manufacturing Tooling Technology, Ferris State University
Certified Tool and Die Maker/ United States Department of Labor

c. Temporary, full-time

Paul Driggers, Technical Instructor, 1996
B.S. Trade and Technical Education, Ferris State University
A.A.S. Manufacturing Tooling Technology, Ferris State University

d. Adjunct

As needed.

e. Program Cordinator

Kenneth Kuk, Professor, 1985
M.S. Engineering Management, Western Michigan University
M.S. Occupational Education, Ferris State University
B.E.T. Manufacturing Engineering Technology, Wayne State University
A.A.S. Welding Technology, Ferris State University

2. FTE overload

FTE overloads are nominal as required for varying student numbers.

See Attachment 4, Appendix A
Course Overload Data Chart

MFGT 150 – Manufacturing Process
Credit Hours: 2 (1 Lecture: 3 Lab)

3. Off-campus programs: location and involvement of faculty

Off-campus courses that are offered:

MFGT 151 – Metal Stamping Process
MFGT 153 – Die Construction and Repair
MFGT 251 – Die Tryout
MFGT 253 – Die Estimating/Project Management

4. Administration: degrees (including year, field of study, and institution), certificates, and/or related work experience

Administration

a. Douglas Chase, Assistant Dean/Department Head, Design, Mfg., & Graphic Arts
M.S. Education, Michigan State University
B.S. Trade and Technical Education, Ferris State University

b. Jack Richards, Acting Dean, College of Technology
M.S. University of Michigan
B.S. Ferris State University

5. Support staff (clerical, technical, ...)

One clerical and one technical support staff person is shared with 6 other programs and 30 other faculty

a. Linda Faysel, Department Secretary, DMGA Department, College of Technology

b. Bruce Hammond, Machine Lab Technician, DMGA Department, College of Technology

6. Student assistants

Students assistants and laboratory aids are hired as required to support laboratory Activities

7. Advisory committee: names, affiliations, and positions of the membership

Advisory board members. **Attachment 5, Appendix A**
Advisory Board Membership List

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Graduate Survey

February 20, 1998

Manufacturing Tooling Technology Alumni, Employer, Advisory Board Member

Since the 1980's, regular academic program review has come to be seen as an essential part of curricular and institutional planning in higher education. Programs at Ferris State University with external accrediting agencies have always had to produce self-study reports periodically. The 1987 North Central Association site visit team mandated that the institution develop a program review process for all academic programs at the University.

The goal of program review is to insure that the academic programs of the University achieve and maintain the highest possible standards of academic excellence. Based on a schedule that spans six years, every academic program will have 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.

During the 1998/99 academic year, the Manufacturing Tooling Technology program at Ferris will be reviewed. A vital part of the review process will be your professional input. Enclosed find a survey that we request you complete. Please return the NCS answer sheet and your written responses in the addressed stamped envelope by March 13, 1998. The survey should take 15-20 minutes to complete. Individual responses are confidential but the overall responses will be analyzed to help determine the status, trend, and future of the Manufacturing Tooling Technology program at Ferris.

Your participation in this survey is critical in order for us to get an accurate review of our Manufacturing Tooling Technology program. On behalf of the students and faculty of the Manufacturing Tooling Technology program, we thank you for your time and input.

Sincerely,

Kenneth A. Kuk, C.Mfg.E.
Professor and Faculty Coordinator

Encl.

Manufacturing Tooling Technology
Program Content Application Survey

Use the answer sheet provided:

1. If you are a Manufacturing Tooling Technology Graduate (check **A**). Also, please answer questions 1-35 [A]

MANUFACTURING TOOLING A.A.S. PROGRAM

Please fill in the appropriate response to the following questions.

To what extent does a graduate require the course knowledge?

II. ***Please circle appropriate rating***

	To a Great Extent	Somewhat	Neutral	Very Little	Not at Al
Fall First Year					
1. Metal Removal 1 (MFGT 111, 8 credits) For beginning Machine Tool Students. Shop Safety, measuring instruments, layout and bench work. Drilling machines, tool room lathes, vertical/horizontal milling machines, introduction to CNC machining and floor grinders.	A	B	C	D	E
2. Machinery Handbook Calculations (MFGT 112, 3 credits) The use of the Machinery's Handbook calculations. Tables, charts, and formulas are applied to the needs of the toolmaker such as: ratios, proportions, tapers, levers, screws, pulleys, gear trains, allowances, tolerances, fits, hole circles, and segments. Set up and checking procedures used by the toolmaker. Emphases on algebra, applied geometric principles, and right angle trigonometric functions.	A	B	C	D	E
3. Blueprint Reading and Analysis (IDTD 150, 2 credits) For first year manufacturing tooling students. Print layout of information, tolerance block, revision block, do not scale block, notes, bill of material and product detail layout; sketch drawings of simple details from selected shop drawings to include dimensioning, tolerancing, and notes as related to the understanding of reading a part, detail, tool, mold, or die blueprint. Projection, sectioning, and alternative dimensioning; emphasis on shop floor communication.	A	B	C	D	E

Winter First Year					
4. Metal Removal 2 (MFGT 121 , 8 credits) For second semester manufacturing tooling students. More advanced machining operations on the lathe and mill along with basic surface grinding. Thread and taper terminology, measurement, and methods of machining are new topics along with boring, broaching, indexing, rotary table milling, tool post grinding, applying cutting tool materials such as ceramic, carbide tooling and coolants/lubricants.	A	B	C	D	E
5. CNC Manual Part Programming (MFGT 122, 4 credits) Manual programming for numerical controlled machinery. Types of CNC controls, machinery, formats, and basic terminology studies. Set-up, tooling, fixturing, and basic program storage methods. Simple part programming includes milling, 3-D contour, and turning. A basic CAD/CAM demo will also be discussed.	A	B	C	D	E
Fall Second Year					
6. Metal Forming Die Construction (MFGT 211, 8 credits) Metal forming die making; use of mill duplicating. CNC electrical discharge machining, tool tryout and rework, and CNC milling. Laboratory projects specialize in metal forming. Diemaking stamping presses, die automation, and electrical sensors; heat treating, whirl-I-gig grinding, surface grinding, and hand grinding.	A	B	C	D	E
7. CAD/CAM for CNC Machining (MFGT 212, 4 credits) Fundamentals of programming tool motion on complex surfaces that are created on a 3-D (CAD) based system. Create simple 2-D and 3-D drawings, drive tool motion over the #-D surface, post process the tool data, and edit the output files before sending the program to a machine tool for machining. The basic CMM principles creation of verification of a surface.	A	B	C	D	E
8. Introduction to Material Science (MATL 240, 4 credits) Engineering materials: metals, polymers, and ceramics: atomic structure and bonding, properties selection, and testing of materials, failure modes, methods of production and fabrication, methods of changing properties including heat treatment of metals, alloying and surface treatments, mechanical working, composites and compound bonding. Common classification systems used to identify the various engineering materials.	A	B	C	D	
9. Plastic Mold Construction (MFGT 221, 8 credits) Continuation of previous machine tool training in which mold making, mill duplicating, and pantographing, CNC electrical discharge machining, mold polishing, and the mold try-out machining.	A	B	C	D	E

MANUFACTURING TOOLING A.A.S. PROGRAM

General Education:	To a Great Extent	Somewhat	Neutral	Very Little	Not at All
10. Scientific Understanding In General, 3 credits)	A	B	C	D	E
11. Mathematics: Intermediate Algebra & Numerical Trigonometry (MATH 116, 4 credits) Special factoring forms, exponents, roots and radicals, scientific notation, fractions, first and second degree equations and inequalities, functions and graphs, logarithms, and solutions of logarithmic and exponential equations, systems of equations up to 3x3 and Cramer's Rule, numerical trigonometry including vectors, Law of Sines and Cosines, and graphs of trigonometric functions.	A	B	C	D	E
12. Cultural Enrichment (IN GENERAL, 3 credits)	A	B	C	D	E
13. Social Awareness (IN GENERAL, 3 credits)	A	B	C	D	E

In thinking over your experiences at Ferris State University, to what extent do you feel your education prepared you for success?

MANUFACTURING TOOLING A.A.S. PROGRAM

	To a Great Extent	Somewhat	Neutral	Very Little	Not at All
14. Overall Technical training	A	B	C	D	E
15. Gaining a broad general education about different fields of knowledge	A	B	C	D	E
16. Writing clearly and effectively	A	B	C	D	E
17. Acquiring proficiency with the use of personal computers	A	B	C	D	E
18. Developing values and ethical standards	A	B	C	D	E
19. The ability to think analytically and logically	A	B	C	D	E

20.	**The ability to learn on your own, pursue ideas, and find information you need**	**A**	**B**	**C**	**D**	**E**
21.	**How effectively did the Ferris Manufacturing Tooling Program prepare you for employment?**	**A**	**B**	**C**	**D**	**E**

22. Do you think a four year B.S. Tooling Engineering program at Ferris would be beneficial to industry and our students at Ferris?

A. Yes
B. No
C. Not sure

23. Are you currently a member of the American Society of Manufacturing Engineers?

A. Yes
B. No

24. Do you currently hold a professional certification / registration?

A. Tool and Die Maker / Through the Department of Labor
B. Society of Manufacturing Engineers, Certified Manufacturing Engineer
C. Professional Engineer
D. Other
E. No

25. What is your approximate annual salary?

A. Less than $40,000
B. $40,000 - 49,000
C. $50,000 - 59,000
D. $60,000 - 69,000
E. More than $69,000

26. What industry are you employed in?

A. Tool and Die construction.
B. Automation equipment manufacturing/application/sales
C. Other/general manufacturing
D. Construction
E. Defense or aerospace

27. What is your job title?

A. Engineer
B. Technician
C. Management
D. Tool Maker / Machinist
E. Other

28. Are you currently enrolled in a degree granting program?

A. Bachelor of Science
B. Master of Science
C. Doctoral
D. No

29. Have you received an additional degree(s) since completing the Ferris manufacturing tooling program?

A. Bachelor of Science
B. Master of Science
C. Doctoral
D. No

30. In general, how satisfied were you with your overall experience in the manufacturing tooling program at Ferris State University?

A. To a great extent
B. Somewhat
C. Neutral
D. Very little
E. Not at all

31. Would you recommend the manufacturing tooling program to a friend or relative?

A. Yes
B. No
C. Not sure

32. When you were a Manufacturing Tooling major at Ferris, did you receive a scholarship?

A. Yes
B. No

Your thoughtful responses to the following questions are especially necessary and appreciated.

33. What do you believe was the most valuable part of your coursework? (please write in your response)

34. What do you believe was the least valuable part of your coursework? (please write in your response)

35. What trends in the manufacturing tooling industry do you see impacting the program in the next five years? (please write in your response)

Thank You

Please enclose your answer sheet and this page in the enclosed envelope by March 13, 1998

Summary of Data--Manufacturing Tooling Program

1998

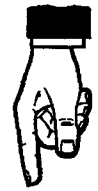
	To what extent does a graduate require the course knowledge? N=51 To what extent do you feel the MFGT program prepares graduates for success?	To a Great Extent	Somewhat	Neutral	Very Little	Not at All	Combined A and B
1	Metal Removal I	96.1%	2.0%		2.0%		98.1%
2	Machinery handbook Calculations	70.0%	26.0%	2.0%	2.0%		96.0%
3	Blueprint Reading and Analysis	94.0%	4.0%		2.0%		98.0%
4	Metal Removal 2	82.0%	16.0%		2.0%		98.0%
5	CNC Manual Part Programming	68.0%	22.0%	10.0%			90.0%
6	Metal Forming Die Construction	68.0%	24.0%	6.0%		2.0%	92.0%
7	CAD/CAM for CNC Machining	74.0%	24.0%	2.0%			98.0%
8	Introduction to Material Science	40.0%	40.0%	18.0%	2.0%		80.0%
9	Plastic Mold Construction	64.0%	24.0%	8.0%	2.0%	2.0%	88.0%
10	Scientific Understanding	26.0%	26.0%	38.0%	6.0%	4.0%	52.0%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.0%	38.0%	4.0%	2.0%		94.0%
12	Cultural Enrichment	10.0%	16.0%	40.0%	16.0%	18.0%	26.0%
13	Social Awareness	6.0%	24.0%	36.0%	18.0%	16.0%	30.0%
14	Overall Technical Training	68.8%	31.3%				100.1%
15	Gaining a broad general education about different fields of knowledge	47.9%	41.7%	10.4%			89.6%
16	Writing clearly and effectively	25.0%	54.2%	12.5%	6.3%	2.1%	79.2%
17	Acquiring proficiency with the use of personal comput rs	29.2%	37.5%	16.7%	10.4%	6.3%	66.7%
18	Developing values and ethical standards	20.8%	47.9%	20.8%	4.2%	6.3%	68.7%
19	The ability to think analytically and logically	56.3%	33.3%	6.3%	4.2%		89.6%
20	The ability to learn on your own, pursue ides and find information you need	64.6%	31.3%	4.2%			95.9%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	64.6%	31.3%	2.1%	2.1%		95.9%

Sorted By

Summary of Data--Manufacturing Tooling Program 1998

	To what extent does a graduate require the course knowledge? N=51 To what extent do you feel the MFGT program prepares graduates for success?	To a Great Extent	Somewhat	Neutral	Very Little	Not at All	Combined A and B
1	Metal Removal I	96.1%	2.0%		2.0%		98.1%
3	Blueprint Reading and Analysis	94.0%	4.0%		2.0%		98.0%
4	Metal Removal 2	82.0%	16.0%		2.0%		98.0%
7	CAD/CAM for CNC Machining	74.0%	24.0%	2.0%			98.0%
2	Machinery handbook Calculations	70.0%	26.0%	2.0%	2.0%		96.0%
14	Overall Technical Training	68.8%	31.3%				100.1%
5	CNC Manual Part Programming	68.0%	22.0%	10.0%			90.0%
6	Metal Forming Die Construction	68.0%	24.0%	6.0%		2.0%	92.0%
20	The ability to learn on your own, pursue ides and find information you need	64.6%	31.3%	4.2%			95.9%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	64.6%	31.3%	2.1%	2.1%		95.9%
9	Plastic Mold Construction	64.0%	24.0%	8.0%	2.0%	2.0%	88.0%
19	The ability to think analytically and logically	56.3%	33.3%	6.3%	4.2%		89.6%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.0%	38.0%	4.0%	2.0%		94.0%
15	Gaining a broad general education about different fields of knowledge	47.9%	41.7%	10.4%			89.6%
8	Introduction to Material Science	40.0%	40.0%	18.0%	2.0%		80.0%
17	Acquiring proficiency with the use of personal computers	29.2%	37.5%	16.7%	10.4%	6.3%	66.7%
10	Scientific Understanding	26.0%	26.0%	38.0%	6.0%	4.0%	52.0%
16	Writing clearly and effectively	25.0%	54.2%	12.5%	6.3%	2.1%	79.2%
18	Developing values and ethical standards	20.8%	47.9%	20.8%	4.2%	6.3%	68.7%
12	Cultural Enrichment	10.0%	16.0%	40.0%	16.0%	18.0%	26.0%
13	Social Awareness	6.0%	24.0%	36.0%	18.0%	16.0%	30.0%

Sorted By



Summary of Data--Manufacturing Tooling Program
1998

		A	B				
To what extent does a graduate require the course knowledge? N=51 **To what extent do you feel the MFGT program prepares graduates for success?**		**To a Great Extent**	**Somewhat**	**Neutral**	**Very Little**	**Not at All**	**Combined A and B**
14	Overall Technical Training	68.8%	31.3%				100.0%
1	Metal Removal I	96.1%	2.0%		2.0%		98.1%
3	Blueprint Reading and Analysis	94.0%	4.0%		2.0%		98.0%
4	Metal Removal 2	82.0%	16.0%		2.0%		98.0%
7	CAD/CAM for CNC Machining	74.0%	24.0%	2.0%			98.0%
2	Machinery handbook Calculations	70.0%	26.0%	2.0%	2.0%		96.0%
20	The ability to learn on your own, pursue ides and find information you need	64.6%	31.3%	4.2%			95.9%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	64.6%	31.3%	2.1%	2.1%		95.9%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.0%	38.0%	4.0%	2.0%		94.0%
6	Metal Forming Die Construction	68.0%	24.0%	6.0%		2.0%	92.0%
5	CNC Manual Part Programming	68.0%	22.0%	10.0%			90.0%
19	The ability to think analytically and logically	56.3%	33.3%	6.3%	4.2%		89.6%
15	Gaining a broad general education about different fields of knowledge	47.9%	41.7%	10.4%			89.6%
9	Plastic Mold Construction	64.0%	24.0%	8.0%	2.0%	2.0%	88.0%
8	Introduction to Material Science	40.0%	40.0%	18.0%	2.0%		80.0%
16	Writing clearly and effectively	25.0%	54.2%	12.5%	6.3%	2.1%	79.2%
18	Developing values and ethical standards	20.8%	47.9%	20.8%	4.2%	6.3%	68.7%
17	Acquiring proficiency with the use of personal computers	29.2%	37.5%	16.7%	10.4%	6.3%	66.7%
10	Scientific Understanding	26.0%	26.0%	38.0%	6.0%	4.0%	52.0%
13	Social Awareness	6.0%	24.0%	36.0%	18.0%	16.0%	30.0%
12	Cultural Enrichment	10.0%	16.0%	40.0%	16.0%	18.0%	26.0%

Summary of Data--Manufacturing Tooling Program 1998

Alumni: N=42

	To what extent does a graduate require the course knowledge? To what extent do you feel the MFGT program prepares graduates for success?	To a Great Extent	Somewhat	Neutral	Very Little	Not at All	Combined A and B
1	Metal Removal I	95.2%	2.4%		2.4%		97.6%
3	Blueprint Reading and Analysis	92.7%	4.9%		2.4%		97.6%
4	Metal Removal 2	80.5%	17.1%		2.4%		97.6%
7	CAD/CAM for CNC Machining	73.2%	24.4%	2.4%			97.6%
2	Machinery handbook Calculations	70.7%	24.4%	2.4%	2.4%		95.1%
14	Overall Technical Training	65.9%	34.1%				100.0%
5	CNC Manual Part Programming	65.9%	22.0%	12.2%			87.9%
20	The ability to learn on your own, pursue ides and find information you need	63.4%	34.1%	2.4%			97.5%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	61.0%	34.1%	2.4%	2.4%		95.1%
9	Plastic Mold Construction	61.0%	29.3%	7.3%		2.4%	90.3%
6	Metal Forming Die Construction	61.0%	29.3%	7.3%		2.4%	90.3%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.1%	39.0%	2.4%	2.4%		95.1%
19	The ability to think analytically and logically	53.7%	36.6%	7.3%	2.4%		90.3%
15	Gaining a broad general education about different fields of knowledge	46.3%	46.3%	7.3%			92.6%
8	Introduction to Material Science	41.5%	36.6%	19.5%	2.4%		78.1%
17	Acquiring proficiency with the use of personal computers	29.3%	36.6%	19.5%	9.8%	4.9%	65.9%
16	Writing clearly and effectively	26.8%	51.2%	12.2%	7.3%	2.4%	78.0%
10	Scientific Understanding	24.4%	24.4%	39.0%	7.3%	4.9%	48.8%
18	Developing values and ethical standards	17.1%	51.2%	22.0%	2.4%	7.3%	68.3%
12	Cultural Enrichment	9.8%	12.2%	41.5%	17.1%	19.5%	22.0%
13	Social Awareness	7.3%	71.7%	36.6%	19.5%	19.5%	79.0%

Summary of Data--Manufacturing Tooling Program
1998

Alumni: N=42

To what extent does a graduate require the course knowledge? To what extent do you feel the MFGT program prepares graduates for success?		To a Great Extent	Somewhat	Neutral	Very Little	Not at All	Combined A and B
14	Overall Technical Training	65.9%	34.1%				100.0%
7	CAD/CAM for CNC Machining	73.2%	24.4%	2.4%			97.6%
1	Metal Removal I	95.2%	2.4%		2.4%		97.6%
4	Metal Removal 2	80.5%	17.1%		2.4%		97.6%
3	Blueprint Reading and Analysis	92.7%	4.9%		2.4%		97.6%
20	The ability to learn on your own, pursue ides and find information you need	63.4%	34.1%	2.4%			97.5%
2	Machinery handbook Calculations	70.7%	24.4%	2.4%	2.4%		95.1%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.1%	39.0%	2.4%	2.4%		95.1%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	61.0%	34.1%	2.4%	2.4%		95.1%
15	Gaining a broad general education about different fields of knowledge	46.3%	46.3%	7.3%			92.6%
19	The ability to think analytically and logically	53.7%	36.6%	7.3%	2.4%		90.3%
9	Plastic Mold Construction	61.0%	29.3%	7.3%		2.4%	90.3%
6	Metal Forming Die Construction	61.0%	29.3%	7.3%		2.4%	90.3%
5	CNC Manual Part Programming	65.9%	22.0%	12.2%			87.9%
13	Social Awareness	7.3%	71.7%	36.6%	19.5%	19.5%	79.0%
8	Introduction to Material Science	41.5%	36.6%	19.5%	2.4%		78.1%
16	Writing clearly and effectively	26.8%	51.2%	12.2%	7.3%	2.4%	78.0%
18	Developing values and ethical standards	17.1%	51.2%	22.0%	2.4%	7.3%	68.3%
17	Acquiring proficiency with the use of personal computers	29.3%	36.6%	19.5%	9.8%	4.9%	65.9%
10	Scientific Understanding	24.4%	24.4%	39.0%	7.3%	4.9%	48.8%
12	Cultural Enrichment	9.8%	12.2%	41.5%	17.1%	19.5%	22.0%

22		Do you think a 4 yr. BS Tooling Engineering program at FSU would be beneficial to industry and our students at FSU?	Alumni N=42
	a	Yes	59.5%
	b	No	7.1%
	c	Not sure	28.6%
23		Are you currently a Member of the American Society of Manufacturing Engineers?	
	a	Yes	29.3%
	b	No	68.3%
24		Do you currently hold a profesional certification/registration?	
	a	Tool and Die Maker/Through Dept. of Labor	22.0%
	b	Society of Manufacturing Engineers, Certified Manufacturing Engineer	14.6%
	c	Professional Engineer	9.8%
	d	Other	14.6%
	e	No	39.0%
25		What is your approximate annual salary?	
	a	Less than $40,000	17.5%
	b	$40,000-$49,000	37.5%
	c	$50,000-$59,000	22.5%
	d	$60,000-$69,000	15.0%
	e	More than $69,000	7.5%
26		What industry are you employed in?	
	a	Tool and Die construction	37.5%
	b	Automation equipment mfg/application/sales	22.5%
	c	Other/general manufacturing	35.0%
	d	Construction	2.5%
	e	Defense or aerospace	2.5%
27		What is your job title?	
	a	Engineer	45.0%
	b	Technician	5.0%
	c	Management	12.5%
	d	tool Maker/Machinist	30.0%
	e	Other	7.5%
28		Are you currently enrolled in a degree-granting program?	
	a	Bachelor of Science	9.8%
	b	Master of Science	7.3%
	c	Doctoral	0.0%
	d	Other	82.9%
29		Have you received an additional degree(s) since completing the FSU manufacturing tooling program?	
	a	Bachelor of Science	24.4%
	b	Master of Science	2.4%
	c	Doctoral	2.4%
	d	Other	70.7%
30		In general, how satisfied were you with your overall experience in the manufacturing tooling program at FSU?	
	a	To a great extent	73.2%
	b	Somewhat	22.0%
	c	Neutral	2.4%
	d	Very little	2.4%
	e	Not at all	0.0%
31		Would you recommen the manufacturing tooling program to a friend or relative?	
	a	Yes	97.6%
	b	No	2.4%
	c	Not sure	
32		When you were a Manufacturing Tooling major at FSU, did you receive a scholarship?	
	a	Yes	31.7%
	b	No	68.3%

Manufacturing Tooling Technology – Survey Comments

4/9/98

Question #33 What do you believe was the most valuable part of your coursework?

Alumni

Die construction & handbook calculations. Also CNC programming.

Labs and hands on experiences.

Gus Bolender as an instructor took great interest in his students and helped them develop a great interest in the field of manufacturing.

Hands on training, field trips, project mgmt is mostly self directed.

Machine shop labs. Industry related projects.

Hands on machining.

Learning about processing, CNC machinery and basic skills that are needed on a regular basis in manufacturing facility. Machinery's handbook class was very helpful.

The machining of the projects, be it manual or CNC. Equally important was the blueprint reading class.

Interaction with professors with industrial experience (R. Laduke, D. Beam, G. Bolender). Hands on experience.

The program was all important. I think what was left out was the promotion of the room for students to run their own business of product or service. Not right out of school, but years after. Ideas of what is out there. Get students excited about what the American dream is about – Free enterprise. Enough said.

The hands on experience on the tool room equipment.

Basic machining & blue print reading.

Learning ways to increase productivity. "Time is money!"

Understanding cutting tools and machining processes. This is very important in any aspect of manufacturing. All students going thru this course need to be exposed to all items in this program. I feel the knowledge obtained is vital to the individual to perform competently in industry.

The hands on practical applications. Being able to understand tool construction is a must for design and engineering. There are to many people designing products that do not have a clue how to produce tooling to make the products they are designing.

Question #33 What do you believe was the most valuable part of your coursework?

Alumni continued

Metal forming courses along w/ blueprint reading.

Hands on training to what you learn in this class. Whether it be working with computers or the equipment in the shop.

Experience on computer controlled machines.

The actual working hours in the shop.

The hands on training in labs was probably the most valuable part of the coursework.

Machine time and the math classes. Hands on machine time and trigonometry classes benefited me the most. Students need two to three times the machine time I was offered. Students also need to be very fluent in math.

Hands on work.

The hands on and lab classes. Also doing group class projects.

I was lucky enough to be able to utilize rapid prototyping techniques in my course work in the shop. You should be using these techniques more and more in the future.

Machine tool lab, hands on training.

Molds/dies

The requirement to think on your own. Use your brain. Also manufacturing with CNC equipment. Programming and setup is very valuable.

The hands on in the labs.

Machine tool labs.

Hands on machine tool, CNC, and toolmaking training

At the time of my schooling, I believe that the information we were given was cutting edge. Although the plants I viewed and decided to work at were far behind in technology. The foresight I as given helped me in the long run.

I believe the hands-on experience coupled with good teaching contributed to a successful program. I was exposed to a lot of different techniques and learned to broaden my thinking to see many and eventually the best way to approach a specific job.

The hands on work and fact that our projects were real and we actually saw the results.

The lab setting where the parts that were produced could be used in the machining process.

Question #33 What do you believe was the most valuable part of your coursework?

Alumni continued

How to use the machine.

Different types of tooling (carbide, ceramic) and how to run these. This is a very important pat of this trade because it can make it very productive.
The hands on training. Learning from the teachers with them showing the right way to do a process.

Question #34: What do you believe was the least valuable part of your coursework?

Alumni

None

Social awareness

Some aspects of outdated technology or some practices that aren't used are still taught. These should be replaced.

Some of the lesser valued parts of my coursework were things that are now outdated by technology. For example, Rotary table milling, etc..... I believe that these things are important and I use this information, but in order to emphasize the most current techniques, it's not good to dwell on outdated material.

The last math class I took 124 was "except for the first two weeks" completely unneeded and caused myself a great deal of unnecessary stress. Plus the reason I did not continue on at Ferris was the next math class needed. I have not seen any use for calculus in any die situation.

Humanities

All core classes are needed for a good broad knowledge of manufacturing and manu. technology used today.

Social Science & Cultural Awareness

Statistics – seems to be a wasted topic when just being creative in solving problems is really rewarding and in high demand.

Social Awareness/Cultural Enrichment

Social Awareness and Cultural Enrichment

Stressing the importance of attendance. I already new a large part of the program from experience. I always did very well on tests and quizes but got a D because of attendance. That's not right.

ALL the humanities, cultural enrichment and social awareness crap that you have to take. In my opinion Ferris biggest mistake was becoming a university and second hiring Helen Povivich as President.

Humanities

Electives, ie.-cultural enrichment and social awareness. I have yet to find a place to apply them to.

Some electives could be dropped and courses dealing with managerial aspects of industry could be added. Soft skills could be more involved in the coursework.

Question #34: What do you believe was the least valuable part of your coursework?

Alumni - continued

Drafting. There should be more CAD time spent and blueprint reading.

English and social classes.

History, English and the elective courses we had to take.

Plastic mold construction only due to going into metal forming.

Humanities courses. Although they do help round your education.

Though CNC programming is beneficial, CAD/CAM is not.

Metalurgy.

End mill sharpening.

There was nothing. Just not enough.

Interaction with professors who don't have a clue (D. Chase!).

Humanities & English.

General education classes.

Non-related courses (government, art, etc.).

All parts were valuable.

Everything seemed valuable.

Non-technical classes (art).

Molds – but due to the professor.

Computer controls. We have retrofit CNC on bridgeports (Accurite Mill Pwr & Proto Trak). It seems to take away a lot of the thinking out of making parts. If a machinist can't figure out how to solve a problem, he goes to the AutoCAD operator and has him punch the numbers in for him. It saves a lot of time, but we also seem to get lazier.

More into the plastic.

Computer Numerical Controls. The general widespread introduction needs to be covered due to the fact that there are several different control systems.

CNC, wire burn EDM, CAD/CAM

Question #34: What do you believe was the least valuable part of your coursework?

Alumni Continued

CNC continues to be a big part of tooling. CAM software and applications are very important. I really wish that AutoCAD was emphasized more when I was a student; and I hope it is now. I also wish that a welding course was available for the program.

If plastic industry thinks it is going to expand into more and more exterior panels, the surface issues need to be greatly addressed. I am in charge of major exterior sheetmetal panels, doors, fender, deck lids, qtrs, etc....and if you look at new luxury autos, the waviest, ugly, eye-catching items are the plastic junk hanging all over my smooth sheet metal. I would like some response to this.

Many new openings to replace workers who are about to retire. Average age of our machinists is 49 years old.

Flexable manufacturing & tooling.

Solid modeling on CAD is going to be and is a big item. Students should know how to use this system. The use of CBN, special carbides, ceremics, diamond, other centered materials in metal removal. I see a lot of hard turn and removal of matl in harden sate that eliminates grinding, GD&T.

CNC technology.

Plastics.

Quick lead times with high quality. Students will have to be knowledgeable in all areas related to CNC equipment. The use of computers and their relationship to the industry.

Start using in your course work what is going on in industry today. That's what is going to help the most when students go to work.

Going to all CAD with no paper drawings & more automation. Students can go anywhere to get book smart, but few schools teach hands on and how to do things and solve real life shop problems. Make school more like the real world is.

Question #35: What trends in the manufacturing tooling industry do you see impacting the program in the next five years?

Alumni – continued

Computers and CNC technology

More exotic materials. Hot rolled and cold rolled steels are getting to be a thing of the past. Also development of more and different cutting tools.

New cutting tool materials. More automation. Many new innovations in the stamping industry.

Lead moldmakers in our shop will so be expected to use CAD to design and analyze molds, rather than receive blueprints. Much CAM/CAD training is a must. Ferris should advertise this progrm more in our area. Branch Area Career Center, Coldwater, MI. Our shop hires untrained and sends them to night school. These students don't get as much, but doesn't cost them anything.

More use of CNC equipment (unattended, machining). Pro engineering.

I find that there are very few people who will learn the programming skills that are required in industry.

Every die and machine I have built has had a PLC (Slic 500 or Micro 1000) on it with probes, laser and optical proxes to ensure the quality of the part being produced. This needs to be added to the course of study.

3D solids design & manufacturing.

In plastic mold construction rapid prototyping and mold construction timing in general is under great pressure. Finding ways to produce tooling faster without raising cost or lower quality.

More reliance on computerized machines and systems. Students will need to be more computer literate, but still need to know how to live in the manual aspect of manufacturing.

The demand for journeymen tool and die makers increases.

Trends I think that will impact the industry would be more use of machine automation and extensive use of CMM machines as tolerances get tighter.

The aid of computers. When I started working 10 years ago computers weren't out in the shop floor except for CNC. Now we have four PCs for the tool makers.

Less prototyping from design to final mfg., and quicker ways to get final product thru mfg.

The skill level of "journeymen" tool and die makers continues to erode. Ferris State graduates in general have a much higher skill level than journeymen with 5 years of experience. Many employers require accredited program to produce journeymen tool and die makers/machinists.

The speed of the new CNC machines & all the new capabilities they have.

The rise of industry and the need for skilled machinists with a college degree.

Question #35: What trends in the manufacturing tooling industry do you see impacting the program in the next five years?

Alumni – continued

The program needs to have a course or integrated ito an existing course information on mfg. Processes other than toolroom topics only. I realize this is covered on the 4 year side but it would be beneficial for 2 year graduates to get some exposure to production processes and methods in a mfg. environment.

The need for more internships.

CNC. Space age materials and coatings

Tight tolerance

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology
Employer Survey

February 20, 1998

Manufacturing Tooling Technology Alumni, Employer, Advisory Board Member

Since the 1980's, regular academic program review has come to be seen as an essential part of curricular and institutional planning in higher education. Programs at Ferris State University with external accrediting agencies have always had to produce self-study reports periodically. The 1987 North Central Association site visit team mandated that the institution develop a program review process for all academic programs at the University.

The goal of program review is to insure that the academic programs of the University achieve and maintain the highest possible standards of academic excellence. Based on a schedule that spans six years, every academic program will have 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.

During the 1998/99 academic year, the Manufacturing Tooling Technology program at Ferris will be reviewed. A vital part of the review process will be your professional input. Enclosed find a survey that we request you complete. Please return the NCS answer sheet and your written responses in the addressed stamped envelope by March 13, 1998. The survey should take 15-20 minutes to complete. Individual responses are confidential but the overall responses will be analyzed to help determine the status, trend, and future of the Manufacturing Tooling Technology program at Ferris.

Your participation in this survey is critical in order for us to get an accurate review of our Manufacturing Tooling Technology program. On behalf of the students and faculty of the Manufacturing Tooling Technology program, we thank you for your time and input.

Sincerely,

Kenneth A. Kuk, C.Mfg.E.
Professor and Faculty Coordinator

Encl.

Manufacturing Tooling Technology
Program Content Application Survey

Use the answer sheet provided:

1. If you are an Employer of a Ferris Manufacturing Tooling Technology Graduate (check B). Also, please answer questions 1-22 and 33-35. B

MANUFACTURING TOOLING A.A.S. PROGRAM

Please fill in the appropriate response to the following questions.

To what extent does a graduate require the course knowledge?

III. ***Please circle appropriate rating***

	To a Great Extent	Somewhat	Neutral	Very Little	Not at Al
Fall First Year					
1. Metal Removal 1 (MFGT 111, 8 credits) For beginning Machine Tool Students. Shop Safety, measuring instruments, layout and bench work. Drilling machines, tool room lathes, vertical/horizontal milling machines, introduction to CNC machining and floor grinders.	A	B	C	D	E
2. Machinery Handbook Calculations (MFGT 112, 3 credits) The use of the Machinery's Handbook calculations. Tables, charts, and formulas are applied to the needs of the toolmaker such as: ratios, proportions, tapers, levers, screws, pulleys, gear trains, allowances, tolerances, fits, hole circles, and segments. Set up and checking procedures used by the toolmaker. Emphases on algebra, applied geometric principles, and right angle trigonometric functions.	A	B	C	D	E
3. Blueprint Reading and Analysis (TDTD 150, 2 credits) For first year manufacturing tooling students. Print layout of information, tolerance block, revision block, do not scale block, notes, bill of material and product detail layout; sketch drawings of simple details from selected shop drawings to include dimensioning, tolerancing, and notes as related to the understanding of reading a part, detail, tool, mold, or die blueprint. Projection, sectioning, and alternative dimensioning; emphasis on shop floor communication.	A	B	C	D	E

Winter First Year					
4. Metal Removal 2 (MFGT 121 , 8 credits) For second semester manufacturing tooling students. More advanced machining operations on the lathe and mill along with basic surface grinding. Thread and taper terminology, measurement, and methods of machining are new topics along with boring, broaching, indexing, rotary table milling, tool post grinding, applying cutting tool materials such as ceramic, carbide tooling and coolants/lubricants.	A	B	C	D	E
5. CNC Manual Part Programming (MFGT 122, 4 credits) Manual programming for numerical controlled machinery. Types of CNC controls, machinery, formats, and basic terminology studies. Set-up, tooling, fixturing, and basic program storage methods. Simple part programming includes milling, 3-D contour, and turning. A basic CAD/CAM demo will also be discussed.	A	B	C	D	E
Fall Second Year					
6. Metal Forming Die Construction (MFGT 211, 8 credits) Metal forming die making; use of mill duplicating. CNC electrical discharge machining, tool tryout and rework, and CNC milling. Laboratory projects specialize in metal forming. Diemaking stamping presses, die automation, and electrical sensors; heat treating, whirl-I-gig grinding, surface grinding, and hand grinding.	A	B	C	D	E
7. CAD/CAM for CNC Machining (MFGT 212, 4 credits) Fundamentals of programming tool motion on complex surfaces that are created on a 3-D (CAD) based system. Create simple 2-D and 3-D drawings, drive tool motion over the #-D surface, post process the tool data, and edit the output files before sending the program to a machine tool for machining. The basic CMM principles creation of verification of a surface.	A	B	C	D	E
8. Introduction to Material Science (MATL 240, 4 credits) Engineering materials: metals, polymers, and ceramics: atomic structure and bonding, properties selection, and testing of materials, failure modes, methods of production and fabrication, methods of changing properties including heat treatment of metals, alloying and surface treatments, mechanical working, composites and compound bonding. Common classification systems used to identify the various engineering materials.	A	B	C	D	
9. Plastic Mold Construction (MFGT 221, 8 credits) Continuation of previous machine tool training in which mold making, mill duplicating, and pantographing, CNC electrical discharge machining, mold polishing, and the mold try-out machining.	A	B	C	D	E

MANUFACTURING TOOLING A.A.S. PROGRAM

General Education:	To a Great Extent	Somewhat	Neutral	Very Little	Not at All
10. Scientific Understanding In General, 3 credits)	A	B	C	D	E
11. Mathematics: Intermediate Algebra & Numerical Trigonometry (MATH 116, 4 credits) Special factoring forms, exponents, roots and radicals, scientific notation, fractions, first and second degree equations and inequalities, functions and graphs, logarithms, and solutions of logarithmic and exponential equations, systems of equations up to 3x3 and Cramer's Rule, numerical trigonometry including vectors, Law of Sines and Cosines, and graphs of trigonometric functions.	A	B	C	D	E
12. Cultural Enrichment (IN GENERAL, 3 credits)	A	B	C	D	E
13. Social Awareness (IN GENERAL, 3 credits)	A	B	C	D	E

To what extent do you feel the MFGT program prepares graduates for success?

MANUFACTURING TOOLING A.A.S. PROGRAM

	To a Great Extent	Somewhat	Neutral	Very Little	Not at All
14. Overall Technical training	A	B	C	D	E
15. Gaining a broad general education about different fields of knowledge	A	B	C	D	E
16. Writing clearly and effectively	A	B	C	D	E
17. Acquiring proficiency with the use of personal computers	A	B	C	D	E
18. Developing values and ethical standards	A	B	C	D	E
19. The ability to think analytically and logically	A	B	C	D	E
20. The ability to learn on your own, pursue ideas, and find information you need	A	B	C	D	E

21. How effectively does the Ferris Manufacturing Tooling program prepare graduates for Employment?	A	B	C	D	E

22. Do you think a four year B.S. Tooling Engineering program at Ferris would be beneficial to industry and our students at Ferris?

A. Yes
B. No
C. Not sure

Your thoughtful responses to the following questions are especially necessary and appreciated.

33. What do you believe was the most valuable part of your coursework? (please write in your response)

34. What do you believe was the least valuable part of your coursework? (please write in your response)

35. What trends in the manufacturing tooling industry do you see impacting the program in the next five years? (please write in your response)

Thank You

Please enclose your answer sheet and this page in the enclosed envelope by March 13, 1998

Summary of Data--Manufacturing Tooling Program

1998

	To what extent does a graduate require the course knowledge? N=51 To what extent do you feel the MFGT program prepares graduates for success?	To a Great Extent	Somewhat	Neutral	Very Little	Not at All	Combined A and B
1	Metal Removal I	96.1%	2.0%		2.0%		98.1%
2	Machinery handbook Calculations	70.0%	26.0%	2.0%	2.0%		96.0%
3	Blueprint Reading and Analysis	94.0%	4.0%		2.0%		98.0%
4	Metal Removal 2	82.0%	16.0%		2.0%		98.0%
5	CNC Manual Part Programming	68.0%	22.0%	10.0%			90.0%
6	Metal Forming Die Construction	68.0%	24.0%	6.0%		2.0%	92.0%
7	CAD/CAM for CNC Machining	74.0%	24.0%	2.0%			98.0%
8	Introduction to Material Science	40.0%	40.0%	18.0%	2.0%		80.0%
9	Plastic Mold Construction	64.0%	24.0%	8.0%	2.0%	2.0%	88.0%
10	Scientific Understanding	26.0%	26.0%	38.0%	6.0%	4.0%	52.0%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.0%	38.0%	4.0%	2.0%		94.0%
12	Cultural Enrichment	10.0%	16.0%	40.0%	16.0%	18.0%	26.0%
13	Social Awareness	6.0%	24.0%	36.0%	18.0%	16.0%	30.0%
14	Overall Technical Training	68.8%	31.3%				100.1%
15	Gaining a broad general education about different fields of knowledge	47.9%	41.7%	10.4%			89.6%
16	Writing clearly and effectively	25.0%	54.2%	12.5%	6.3%	2.1%	79.2%
17	Acquiring proficiency with the use of personal comput rs	29.2%	37.5%	16.7%	10.4%	6.3%	66.7%
18	Developing values and ethical standards	20.8%	47.9%	20.8%	4.2%	6.3%	68.7%
19	The ability to think analytically and logically	56.3%	33.3%	6.3%	4.2%		89.6%
20	The ability to learn on your own, pursue ides and find information you need	64.6%	31.3%	4.2%			95.9%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	64.6%	31.3%	2.1%	2.1%		95.9%

Sorted By

Summary of Data--Manufacturing Tooling Program 1998

	To what extent does a graduate require the course knowledge? N=51 To what extent do you feel the MFGT program prepares graduates for success?	To a Great Extent	Somewhat	Neutral	Very Little	Not at All	Combined A and B
1	Metal Removal I	96.1%	2.0%		2.0%		98.1%
3	Blueprint Reading and Analysis	94.0%	4.0%		2.0%		98.0%
4	Metal Removal 2	82.0%	16.0%		2.0%		98.0%
7	CAD/CAM for CNC Machining	74.0%	24.0%	2.0%			98.0%
2	Machinery handbook Calculations	70.0%	26.0%	2.0%	2.0%		96.0%
14	Overall Technical Training	68.8%	31.3%				100.1%
5	CNC Manual Part Programming	68.0%	22.0%	10.0%			90.0%
6	Metal Forming Die Construction	68.0%	24.0%	6.0%		2.0%	92.0%
20	The ability to learn on your own, pursue ides and find information you need	64.6%	31.3%	4.2%			95.9%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	64.6%	31.3%	2.1%	2.1%		95.9%
9	Plastic Mold Construction	64.0%	24.0%	8.0%	2.0%	2.0%	88.0%
19	The ability to think analytically and logically	56.3%	33.3%	6.3%	4.2%		89.6%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.0%	38.0%	4.0%	2.0%		94.0%
15	Gaining a broad general education about different fields of knowledge	47.9%	41.7%	10.4%			89.6%
8	Introduction to Material Science	40.0%	40.0%	18.0%	2.0%		80.0%
17	Acquiring proficiency with the use of personal computers	29.2%	37.5%	16.7%	10.4%	6.3%	66.7%
10	Scientific Understanding	26.0%	26.0%	38.0%	6.0%	4.0%	52.0%
16	Writing clearly and effectively	25.0%	54.2%	12.5%	6.3%	2.1%	79.2%
18	Developing values and ethical standards	20.8%	47.9%	20.8%	4.2%	6.3%	68.7%
12	Cultural Enrichment	10.0%	16.0%	40.0%	16.0%	18.0%	26.0%
13	Social Awareness	6.0%	24.0%	36.0%	18.0%	16.0%	30.0%

Sorted By

Summary of Data--Manufacturing Tooling Program
1998

	To what extent does a graduate require the course knowledge? N=51 To what extent do you feel the MFGT program prepares graduates for success?	A To a Great Extent	B Somewhat	Neutral	Very Little	Not at All	Combined A and B
14	Overall Technical Training	68.8%	31.3%				100.0%
1	Metal Removal I	96.1%	2.0%		2.0%		98.1%
3	Blueprint Reading and Analysis	94.0%	4.0%		2.0%		98.0%
4	Metal Removal 2	82.0%	16.0%		2.0%		98.0%
7	CAD/CAM for CNC Machining	74.0%	24.0%	2.0%			98.0%
2	Machinery handbook Calculations	70.0%	26.0%	2.0%	2.0%		96.0%
20	The ability to learn on your own, pursue ides and find information you need	64.6%	31.3%	4.2%			95.9%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	64.6%	31.3%	2.1%	2.1%		95.9%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.0%	38.0%	4.0%	2.0%		94.0%
6	Metal Forming Die Construction	68.0%	24.0%	6.0%		2.0%	92.0%
5	CNC Manual Part Programming	68.0%	22.0%	10.0%			90.0%
19	The ability to think analytically and logically	56.3%	33.3%	6.3%	4.2%		89.6%
15	Gaining a broad general education about different fields of knowledge	47.9%	41.7%	10.4%			89.6%
9	Plastic Mold Construction	64.0%	24.0%	8.0%	2.0%	2.0%	88.0%
8	Introduction to Material Science	40.0%	40.0%	18.0%	2.0%		80.0%
16	Writing clearly and effectively	25.0%	54.2%	12.5%	6.3%	2.1%	79.2%
18	Developing values and ethical standards	20.8%	47.9%	20.8%	4.2%	6.3%	68.7%
17	Acquiring proficiency with the use of personal computers	29.2%	37.5%	16.7%	10.4%	6.3%	66.7%
10	Scientific Understanding	26.0%	26.0%	38.0%	6.0%	4.0%	52.0%
13	Social Awareness	6.0%	24.0%	36.0%	18.0%	16.0%	30.0%
12	Cultural Enrichment	10.0%	16.0%	40.0%	16.0%	18.0%	26.0%

Summary of Data--Manufacturing Tooling Program
1998

Industry: N=2

	To what extent does a graduate require the course knowledge? To what extent do you feel the MFGT program prepares graduates for success?	To a Great Extent	Somewhat	Neutral	Very Little	Not at All	Combined A and B
1	Metal Removal I	100.0%					100.0%
2	Machinery handbook Calculations	100.0%					100.0%
3	Blueprint Reading and Analysis	100.0%					100.0%
4	Metal Removal 2	100.0%					100.0%
5	CNC Manual Part Programming	100.0%					100.0%
6	Metal Forming Die Construction	100.0%					100.0%
7	CAD/CAM for CNC Machining	100.0%					100.0%
8	Introduction to Material Science	50.0%	50.0%				100.0%
9	Plastic Mold Construction	100.0%					100.0%
10	Scientific Understanding	0.0%	100.0%				100.0%
11	Mathematics: Intermediate Algebra & Numerical Trig	50.0%	50.0%				100.0%
12	Cultural Enrichment	0.0%	50.0%	50.0%			50.0%
13	Social Awareness	0.0%	50.0%	50.0%			50.0%
14	Overall Technical Training	100.0%					100.0%
15	Gaining a broad general education about different fields of knowledge	50.0%	50.0%				100.0%
16	Writing clearly and effectively	0.0%	100.0%				100.0%
17	Acquiring proficiency with the use of personal computers	50.0%	50.0%				100.0%
18	Developing values and ethical standards	100.0%					100.0%
19	The ability to think analytically and logically	100.0%					100.0%
20	The ability to learn on your own, pursue ides and find information you	50.0%	50.0%				100.0%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	100.0%					100.0%

22		Do you think a 4 yr. BS Tooling Engineering program at FSU would be beneficial to industry and our students at FSU?		Industry N=2	
	a	Yes		100.0%	
	b	No			
	c	Not sure			

Manufacturing Tooling Technology – Survey Comments

4/9/98

Question #33 What do you believe was the most valuable part of your coursework?

Industry

Small class size & working close to prof.

Question #34: What do you believe was the least valuable part of your coursework?

Industry

English classes.

Question #35: What trends in the manufacturing tooling industry do you see impacting the program in the next five years?

Industry

Transferring information quickly via internet. Students should learn AutoCAD, which would enable them to send files at the moment of need. Students should learn project management. Shorter tool lead times require handling multiple projects at one time.

CNC machining. Detailed assembly, solids within CAD, shorter lead times to get product to market.

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Student Evaluation of Program

Program: ***Manufacturing Tooling Technology***

Instructions: Circle the number that most closely represents your perception of the Manufacturing Tooling curriculum.

1. Faculty Mastery of Subject Matter Score ____

5	4	3	2	1

Extremely high — Below average

2. Organization of Courses Score ____

5	4	3	2	1

Very organized — Not organized

3. Faculty Concern for Students Score ____

5	4	3	2	1

Very high — Very low

4. Faculty Impartiality on grades and exams Score ____

5	4	3	2	1

5. Use of Profession/Industry Standards Score ____

5	4	3	2	1

Profession/industry standards (such as licensing, certification, accreditation) are consistently used in planning and evaluating this program and content of its courses — **little or no recognition is given to specific profession/ industry standards in planning and evaluating this program**

6. Relevance of Supportive Courses (Non MFGT Courses) Score ____

5	4	3	2	1

Applicable supportive courses are closely coordinated with this program and are kept relevant to program goals and current to the needs of students

Supportive course content reflects no planned approach to meeting needs of students in this program

7. Instructional Staffing (Faculty) Score ____

5	4	3	2	1

Instructional staffing for this program is sufficient to permit optimum program effectiveness

Staffing is inadequate to to meet the needs of this program effectively

8. Facilities Score____

5	4	3	2	1

Present facilities are sufficient to support a high quality program

Present facilities are a major problem for program quality

9. Scheduling of Instructional Facilities Score____

5	4	3	2	1

Scheduling of facilities and equipment for this program is planned to maximize use and be consistent with quality instruction

Facilities and equipment for this program are significantly under-or-over schedule

10. Equipment Score____

5	4	3	2	1

Present equipment is sufficient to support a high quality program

Present equipment is not adequate and represents a threat to program quality

11. Availability of Instructors Score____

5	4	3	2	1

Instruction in all courses required for this program recognizes and responds to individual student interests, learning styles, skills, and abilities through a variety of instructional methods (such as: small group or individualized instruction, laboratory or "hands on" experiences, credit by examination)

Instructional approaches in this program do not consider individual student differences.

12. Adequate and Availability of Instructional Materials and Supplies Score____

5	4	3	2	1

Faculty rate that the instructional materials and supplies as being readily available and in sufficient quantity to support quality instruction

Faculty rate that the instructional materials are limited in amount, generally outdated, and lack relevance to program and student needs

13. Overall quality of instructors Score____

5	4	3	2	1

Rate instructor as extremely high

Rate the instructor as below average

14. Satisfaction with Program Score____

5	4	3	2	1

Very satisfied with the program faculty, equipment, and curriculum

Not satisfied with the program faculty, equipment, and curriculum

15. Student Perceptions of Program Score____

5	4	3	2	1

Students perceive the program curriculum, facilities and equipment to be of the highest quality

Students perceive the program curriculum, facilities and equipment needs improvement

College of Technology
Student Evaluation of Program Results

RESPONSES N=24	EXCELLENT 5	ABOVE AVERAGE 4	AVERAGE 3	BELOW AVERAGE 2	UNACCEPTABLE 1
1. MASTERY OF SUBJECT MATTER	0	**4**	0	0	0
2. ORGANIZATION OF COURSES	0	0	**3**	0	0
3. CONCERN OF STUDENTS	0	**4**	0	0	0
4. IMPARTIALITY ON GRADES AND EXAMS	0	**4**	0	0	0
5. USE OF PROFESSIONAL AND INDUSTRIAL STANDARDS	0	**4**	0	0	0
6. RELEVANCE OF SUPPORTIVE COURSES	0	0	**3**	0	0
7. INSTRUCTIONAL STAFFING	0	**4**	0	0	0
8 FACILITIES	0	0	**3**	0	0
9. SCHEDULING OF INSTRUCTIONAL FACILITIES	0	0	**3**	0	0
10. EQUIPMENT	0	0	**3**	0	0
11. AVAILABILITY OF INSTRUCTOR	0	**4**	0	0	0
12. ADEQUATE AND AVAILABILITY OF INSTRUCTIONAL MATERIALS AND SUPPLIES	0	0	**3**	0	0
13. OVERALL QUALITY OF INSTRUCTORS	0	**4**	0	0	0
14. SATISFACTION OF PROGRAM	0	0	**3**	0	0
15. STUDENT PERCEPTION OF PROGRAM	0	0	**3**	0	0

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Faculty Perception of Program

Program: ***Manufacturing Tooling Technology***

Instructions: Check the block which most closely describes the program you are evaluating.

Faculty Perceptions of the Manufacturing Tooling Technology Program

MY PROGRAM AREA IS:_____

	Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5	Unknown U
1. The FSU MFGT program is consistent with the FSU Mission Statement						
2. The FSU MFGT program is consistent with the objectives and goals of the FSU College of Technology						
3. The FSU MFGT faculty supports the MFGT program.						
4. FSU administration supports the FSU MFGT program.						
5. The cost of administering the FSU MFGT program is inexpensive compared to other FSU technology associate degree programs.						
6. The MFGT current equipment is sufficient to support a high quality program.						
7. The present facilities assigned to the MFGT program are sufficient to support a high quality program.						
8. The currently enrolled MFGT students highly rate instructional effectiveness.						

9. The currently enrolled MFGT students are very satisfied with the program, faculty, equipment & curriculum.						
10. The graduates of the MFGT program easily find employment in their chosen field.						
11. The starting salary of the MFGT program's graduates is comparable to other College of Technology A.A.S. degrees.						
12. The employers of MFGT graduates rate the quality of the program graduate's performance as high when compared to similar degrees from other institutions.						
13. The students in Bachelor Degree programs that ladder from the 2 year MFGT program highly rate the MFGT program.						
14. The academic reputation of the MFGT courses counting towards COT degrees is sound.						
15. MFGT Faculty Development is supported financially by the FSU administration.						
16. The MFGT program needs to expand the options available to recruit potential students to maintain enrollment and satisfy employer demand for graduates.						
17. The FSU MFGT A.A.S. is a quality degree comparable to other associate degrees from similar institutions.						
18. The equipment and facilities are adequate to provide an applicable, and high quality instruction to related technology students who enroll in MFGT courses required for their major.						

COLLEGE OF TECHNOLOGY

Faculty Perception of Program Results

Faculty Perceptions of the Manufacturing Tooling Technology Program

RESPONSES N=27

	Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5	Unknown U
1. The FSU MFGT program is consistent with the FSU Mission Statement	1					
2. The FSU MFGT program is consistent with the objectives and goals of the FSU College of Technology	1					
3. The FSU MFGT faculty supports the MFGT program.	1					
4. FSU administration supports the FSU MFGT program.		2				
5. The cost of administering the FSU MFGT program is inexpensive compared to other FSU technology associate degree programs.			3			
6. The MFGT current equipment is sufficient to support a high quality program.		2				
7. The present facilities assigned to the MFGT program are sufficient to support a high quality program.		2				
8. The currently enrolled MFGT students highly rate instructional effectiveness.	1					
9. The currently enrolled MFGT students are very satisfied with the program, faculty, equipment & curriculum.	1					

	Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5	Unknown U
10. The graduates of the MFGT program easily find employment in their chosen field.	1					
11. The starting salary of the MFGT program's graduates is comparable to other College of Technology A.A.S. degrees.	1					
12. The employers of MFGT graduates rate the quality of the program graduate's performance as high when compared to similar degrees from other institutions.	1					
13. The students in Bachelor Degree programs that ladder from the 2 year MFGT program highly rate the MFGT program.	1					
14. The academic reputation of the MFGT courses counting towards COT degrees is sound.		2				
15. MFGT Faculty Development is supported financially by the FSU administration.		2				
16. The MFGT program needs to expand the options available to recruit potential students to maintain enrollment and satisfy employer demand for graduates.		2				
17. The FSU MFGT A.A.S. is a quality degree comparable to other associate degrees from similar institutions.	1					
18.The equipment and facilities are adequate to provide an applicable, and high quality instruction to related technology students who enroll in MFGT courses required for their major.		2				

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Advisory Committee Perceptions of Program Survey

Manufacturing Tooling Technology
Program Content Application Survey

Use the answer sheet provided:

1. Advisory Board Members, please answer questions 1-22 and 33-35.

MANUFACTURING TOOLING A.A.S. PROGRAM

Please fill in the appropriate response to the following questions.

To what extent does a graduate require the course knowledge?

IV. ***Please circle appropriate rating***

	To a Great Extent	Somewhat	Neutral	Very Little	Not at Al
Fall First Year					
1. Metal Removal 1 (MFGT 111, 8 credits) For beginning Machine Tool Students. Shop Safety, measuring instruments, layout and bench work. Drilling machines, tool room lathes, vertical/horizontal milling machines, introduction to CNC machining and floor grinders.	A	B	C	D	E
2. Machinery Handbook Calculations (MFGT 112, 3 credits) The use of the Machinery's Handbook calculations. Tables, charts, and formulas are applied to the needs of the toolmaker such as: ratios, proportions, tapers, levers, screws, pulleys, gear trains, allowances, tolerances, fits, hole circles, and segments. Set up and checking procedures used by the toolmaker. Emphases on algebra, applied geometric principles, and right Angle trigonometric functions.	A	B	C	D	E
3. Blueprint Reading and Analysis (TDTD 150, 2 credits) For first year manufacturing tooling students. Print layout of information, tolerance block, revision block, do not scale block, notes, bill of material and product detail layout; sketch drawings of simple details from selected shop drawings to include dimensioning, tolerancing, and notes as related to the understanding of reading a part, detail, tool, mold, or die blueprint. Projection, sectioning, and alternative dimensioning; emphasis on shop floor communication.	A	B	C	D	E

Winter First Year					
4. Metal Removal 2 (MFGT 121 , 8 credits) For second semester manufacturing tooling students. More advanced machining operations on the lathe and mill along with basic surface grinding. Thread and taper terminology, measurement, and methods of machining are new topics along with boring, broaching, indexing, rotary table milling, tool post grinding, applying cutting tool materials such as ceramic, carbide tooling and coolants/lubricants.	A	B	C	D	E
5. CNC Manual Part Programming (MFGT 122, 4 credits) Manual programming for numerical controlled machinery. Types of CNC controls, machinery, formats, and basic terminology studies. Set-up, tooling, fixturing, and basic program storage methods. Simple part programming includes milling, 3-D contour, and turning. A basic CAD/CAM demo will also be discussed.	A	B	C	D	E
Fall Second Year					
6. Metal Forming Die Construction (MFGT 211, 8 credits) Metal forming die making; use of mill duplicating. CNC electrical discharge machining, tool tryout and rework, and CNC milling. Laboratory projects specialize in metal forming. Diemaking stamping presses, die automation, and electrical sensors; heat treating, whirl-I-gig grinding, surface grinding, and hand grinding.	A	B	C	D	E
7. CAD/CAM for CNC Machining (MFGT 212, 4 credits) Fundamentals of programming tool motion on complex surfaces that are created on a 3-D (CAD) based system. Create simple 2-D and 3-D drawings, drive tool motion over the #-D surface, post process the tool data, and edit the output files before sending the program to a machine tool for machining. The basic CMM principles creation of verification of a surface.	A	B	C	D	E
8. Introduction to Material Science (MATL 240, 4 credits) Engineering materials: metals, polymers, and ceramics: atomic structure and bonding, properties selection, and testing of materials, failure modes, methods of production and fabrication, methods of changing properties including heat treatment of metals, alloying and surface treatments, mechanical working, composites and compound bonding. Common classification systems used to identify the various Engineering materials.	A	B	C	D	
9. Plastic Mold Construction (MFGT 221, 8 credits) Continuation of previous machine tool training in which mold making, mill duplicating, and pantographing, CNC electrical discharge machining, mold polishing, and the mold try-out machining.	A	B	C	D	E

MANUFACTURING TOOLING A.A.S. PROGRAM

General Education:	To a Great Extent	Somewhat	Neutral	Very Little	Not at All
10. Scientific Understanding In General, 3 credits)	A	B	C	D	E
11. Mathematics: Intermediate Algebra & Numerical Trigonometry (MATH 116, 4 credits) Special factoring forms, exponents, roots and radicals, scientific notation, fractions, first and second degree equations and inequalities, functions and graphs, logarithms, and solutions of logarithmic and exponential equations, systems of equations up to 3x3 and Cramer's Rule, numerical trigonometry including vectors, Law of Sines and Cosines, and graphs of trigonometric functions.	A	B	C	D	E
12. Cultural Enrichment (IN GENERAL, 3 credits)	A	B	C	D	E
13. Social Awareness (IN GENERAL, 3 credits)	A	B	C	D	E

To what extent do you feel the MFGT program prepares graduates for success?

MANUFACTURING TOOLING A.A.S. PROGRAM

		To a Great Extent	Somewhat	Neutral	Very Little	Not at All
14.	Overall Technical training	A	B	C	D	E
15.	Gaining a broad general education about different fields of knowledge	A	B	C	D	E
16.	Writing clearly and effectively	A	B	C	D	E
17.	Acquiring proficiency with the use of personal computers	A	B	C	D	E
18.	Developing values and ethical standards	A	B	C	D	E
19.	The ability to think analytically and logically	A	B	C	D	E
20.	The ability to learn on your own, pursue ideas, and find information you need	A	B	C	D	E
21.	How effectively did the Ferris Manufacturing Tooling program(s) prepare you for employment?	A	B	C	D	E

22. Do you think a four year B.S. Tooling Engineering program at Ferris would be beneficial to industry and our students at Ferris?

A. Yes
B. No
C. Not sure

Your thoughtful responses to the following questions are especially necessary and appreciated.

33. What do you believe was the most valuable part of your coursework? (please write in your response)

34. What do you believe was the least valuable part of your coursework? (please write in your response)

35. What trends in the manufacturing tooling industry do you see impacting the program in the next five years?
(please write in your response)

Thank You

Please enclose your answer sheet and this page in the enclosed envelope by March 13, 1998

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Advisory Committee Perceptions of Program Survey Results

MANUFACTURING TOOLING A.A.S. PROGRAM

Please fill in the appropriate response to the following questions.

To what extent does a graduate require the course knowledge?

V. ***Please circle appropriate rating***

RESPONSES N=5

	To a Great Extent	Somewhat	Neutral	Very Little	Not at Al
Fall First Year					
1. Metal Removal 1 (MFGT 111, 8 credits) For beginning Machine Tool Students. Shop Safety, measuring instruments, layout and bench work. Drilling machines, tool room lathes, vertical/horizontal milling machines, introduction to CNC machining and floor grinders.	**A**	B	C	D	E
2. Machinery Handbook Calculations (MFGT 112, 3 credits) The use of the Machinery's Handbook calculations. Tables, charts, and formulas are applied to the needs of the toolmaker such as: ratios, proportions, tapers, levers, screws, pulleys, gear trains, allowances, tolerances, fits, hole circles, and segments. Set up and checking procedures used by the toolmaker. Emphases on algebra, applied geometric principles, and right angle trigonometric functions.	**A**	B	C	D	E
3. Blueprint Reading and Analysis (TDTD 150, 2 credits) For first year manufacturing tooling students. Print layout of information, tolerance block, revision block, do not scale block, notes, bill of material and product detail layout; sketch drawings of simple details from selected shop drawings to include dimensioning, tolerancing, and notes as related to the understanding of reading a part, detail, tool, mold, or die blueprint. Projection, sectioning, and alternative dimensioning; emphasis on shop floor communication.	**A**	B	C	D	E

Winter First Year					
4. Metal Removal 2 (MFGT 121 , 8 credits) For second semester manufacturing tooling students. More advanced machining operations on the lathe and mill along with basic surface grinding. Thread and taper terminology, measurement, and methods of machining are new topics along with boring, broaching, indexing, rotary table milling, tool post grinding, applying cutting tool materials such as ceramic, carbide tooling and coolants/lubricants.	**A**	B	C	D	E
5. CNC Manual Part Programming (MFGT 122, 4 credits) Manual programming for numerical controlled machinery. Types of CNC controls, machinery, formats, and basic terminology studies. Set-up, tooling, fixturing, and basic program storage methods. Simple part programming includes milling, 3-D contour, and turning. A basic CAD/CAM demo will also be discussed.	**A**	B	C	D	E
Fall Second Year					
6. Metal Forming Die Construction (MFGT 211, 8 credits) Metal forming die making; use of mill duplicating. CNC electrical discharge machining, tool tryout and rework, and CNC milling. Laboratory projects specialize in metal forming. Diemaking stamping presses, die automation, and electrical sensors; heat treating, whirl-I-gig grinding, surface grinding, and hand grinding.	**A**	B	C	D	E
7. CAD/CAM for CNC Machining (MFGT 212, 4 credits) Fundamentals of programming tool motion on complex surfaces that are created on a 3-D (CAD) based system. Create simple 2-D and 3-D drawings, drive tool motion over the #-D surface, post process the tool data, and edit the output files before sending the program to a machine tool for machining. The basic CMM principles creation of verification of a surface.	**A**	B	C	D	E
8. Introduction to Material Science (MATL 240, 4 credits) Engineering materials: metals, polymers, and ceramics: atomic structure and bonding, properties selection, and testing of materials, failure modes, methods of production and fabrication, methods of changing properties including heat treatment of metals, alloying and surface treatments, mechanical working, composites and compound bonding. Common classification systems used to identify the various Engineering materials.	A	**B**	C	D	E
9. Plastic Mold Construction (MFGT 221, 8 credits) Continuation of previous machine tool training in which mold making, mill duplicating, and pantographing, CNC electrical discharge machining, mold polishing, and the mold try-out machining.	A	**B**	C	D	E

MANUFACTURING TOOLING A.A.S. PROGRAM

General Education:	To a Great Extent	Somewhat	Neutral	Very Little	Not at All
10. Scientific Understanding In General, 3 credits)	A	**B**	C	D	E
11. Mathematics: Intermediate Algebra & Numerical Trigonometry (MATH 116, 4 credits) Special factoring forms, exponents, roots and radicals, scientific notation, fractions, first and second degree equations and inequalities, functions and graphs, logarithms, and solutions of logarithmic and exponential equations, systems of equations up to 3x3 and Cramer's Rule, numerical trigonometry including vectors, Law of Sines and Cosines, and graphs of trigonometric functions.	**A**	B	C	D	E
12. Cultural Enrichment (IN GENERAL, 3 credits)	A	B	**C**	D	E
13. Social Awareness (IN GENERAL, 3 credits)	A	B	**C**	D	E

To what extent do you feel the MFGT program prepares graduates for success?

MANUFACTURING TOOLING A.A.S. PROGRAM

	To a Great Extent	Somewhat	Neutral	Very Little	Not at All
14. Overall Technical training	**A**	B	C	D	E
15. Gaining a broad general education about different fields of knowledge	A	**B**	C	D	E
16. Writing clearly and effectively	A	**B**	C	D	E
17. Acquiring proficiency with the use of personal computers	A	B	**C**	D	E
18. Developing values and ethical standards	A	**B**	C	D	E
19. The ability to think analytically and logically	**A**	B	C	D	E
20. The ability to learn on your own, pursue ideas, and find information you need	**A**	B	C	D	E
21. How effectively does the Ferris Manufacturing Tooling Program prepare graduates for Employment?	**A**	B	C	D	E

22. **Do you think a four year B.S. Tooling Engineering program at Ferris would be beneficial to industry and our students at Ferris?**
   A. 66.7% Answered (Yes)
   B. 0% Answered (No)
   C. 33.3% Answered (Not sure)

Your thoughtful responses to the following questions are especially necessary and appreciated.

Advisory Board Survey Comments Summary

Question 33. *What do you believe was the most valuable part of your coursework?*

The hands on experiences. Putting what has been learned in the lecture text into reality

Question 35. *What trends in the manufacturing tooling industry do you see impacting the program in the next five years?*

High speed machining (25,000 RPM), new cutting tool developments (ie. Diamond coatings, etc...) new materials (ie. Micro-alloy steels, compacted graphite Iron, MMC's-multi-matrix composites, new aluminum alloys.

Continue to provide CAD/CAM training. Expand where possible. Provide rapid prototyping introduction.

The rapid changes in materials development (ie. Steels, coatings, etc...)

1. Draw simulation
2. Hydro-forming
3. Explosive forming

Thank You

Please enclose your answer sheet and this page in the enclosed envelope by March 13, 1998

Summary of Data--Manufacturing Tooling Program

1998

To what extent does a graduate require the course knowledge? N=51 To what extent do you feel the MFGT program prepares graduates for success?		To a Great Extent	Somewhat	Neutral	Very Little	Not at All	Combined A and B
1	Metal Removal I	96.1%	2.0%		2.0%		98.1%
2	Machinery handbook Calculations	70.0%	26.0%	2.0%	2.0%		96.0%
3	Blueprint Reading and Analysis	94.0%	4.0%		2.0%		98.0%
4	Metal Removal 2	82.0%	16.0%		2.0%		98.0%
5	CNC Manual Part Programming	68.0%	22.0%	10.0%			90.0%
6	Metal Forming Die Construction	68.0%	24.0%	6.0%		2.0%	92.0%
7	CAD/CAM for CNC Machining	74.0%	24.0%	2.0%			98.0%
8	Introduction to Material Science	40.0%	40.0%	18.0%	2.0%		80.0%
9	Plastic Mold Construction	64.0%	24.0%	8.0%	2.0%	2.0%	88.0%
10	Scientific Understanding	26.0%	26.0%	38.0%	6.0%	4.0%	52.0%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.0%	38.0%	4.0%	2.0%		94.0%
12	Cultural Enrichment	10.0%	16.0%	40.0%	16.0%	18.0%	26.0%
13	Social Awareness	6.0%	24.0%	36.0%	18.0%	16.0%	30.0%
14	Overall Technical Training	68.8%	31.3%				100.1%
15	Gaining a broad general education about different fields of knowledge	47.9%	41.7%	10.4%			89.6%
16	Writing clearly and effectively	25.0%	54.2%	12.5%	6.3%	2.1%	79.2%
17	Acquiring proficiency with the use of personal comput rs	29.2%	37.5%	16.7%	10.4%	6.3%	66.7%
18	Developing values and ethical standards	20.8%	47.9%	20.8%	4.2%	6.3%	68.7%
19	The ability to think analytically and logically	56.3%	33.3%	6.3%	4.2%		89.6%
20	The ability to learn on your own, pursue ides and find information you need	64.6%	31.3%	4.2%			95.9%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	64.6%	31.3%	2.1%	2.1%		95.9%

Sorted By

Summary of Data--Manufacturing Tooling Program
1998

	To what extent does a graduate require the course knowledge? N=51 To what extent do you feel the MFGT program prepares graduates for success?	To a Great Extent	Somewhat	Neutral	Very Little	Not at All	Combined A and B
1	Metal Removal I	96.1%	2.0%		2.0%		98.1%
3	Blueprint Reading and Analysis	94.0%	4.0%		2.0%		98.0%
4	Metal Removal 2	82.0%	16.0%		2.0%		98.0%
7	CAD/CAM for CNC Machining	74.0%	24.0%	2.0%			98.0%
2	Machinery handbook Calculations	70.0%	26.0%	2.0%	2.0%		96.0%
14	Overall Technical Training	68.8%	31.3%				100.1%
5	CNC Manual Part Programming	68.0%	22.0%	10.0%			90.0%
6	Metal Forming Die Construction	68.0%	24.0%	6.0%		2.0%	92.0%
20	The ability to learn on your own, pursue ides and find information you need	64.6%	31.3%	4.2%			95.9%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	64.6%	31.3%	2.1%	2.1%		95.9%
9	Plastic Mold Construction	64.0%	24.0%	8.0%	2.0%	2.0%	88.0%
19	The ability to think analytically and logically	56.3%	33.3%	6.3%	4.2%		89.6%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.0%	38.0%	4.0%	2.0%		94.0%
15	Gaining a broad general education about different fields of knowledge	47.9%	41.7%	10.4%			89.6%
8	Introduction to Material Science	40.0%	40.0%	18.0%	2.0%		80.0%
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10	Scientific Understanding	26.0%	26.0%	38.0%	6.0%	4.0%	52.0%
16	Writing clearly and effectively	25.0%	54.2%	12.5%	6.3%	2.1%	79.2%
18	Developing values and ethical standards	20.8%	47.9%	20.8%	4.2%	6.3%	68.7%
12	Cultural Enrichment	10.0%	16.0%	40.0%	16.0%	18.0%	26.0%
13	Social Awareness	6.0%	24.0%	36.0%	18.0%	16.0%	30.0%

Sorted By

Summary of Data--Manufacturing Tooling Program
1998

	To what extent does a graduate require the course knowledge? N=51 To what extent do you feel the MFGT program prepares graduates for success?	A To a Great Extent	B Somewhat	Neutral	Very Little	Not at All	Combined A and B
14	Overall Technical Training	68.8%	31.3%				100.0%
1	Metal Removal I	96.1%	2.0%		2.0%		98.1%
3	Blueprint Reading and Analysis	94.0%	4.0%		2.0%		98.0%
4	Metal Removal 2	82.0%	16.0%		2.0%		98.0%
7	CAD/CAM for CNC Machining	74.0%	24.0%	2.0%			98.0%
2	Machinery handbook Calculations	70.0%	26.0%	2.0%	2.0%		96.0%
20	The ability to learn on your own, pursue ides and find information you need	64.6%	31.3%	4.2%			95.9%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	64.6%	31.3%	2.1%	2.1%		95.9%
11	Mathematics: Intermediate Algebra & Numerical Trig	56.0%	38.0%	4.0%	2.0%		94.0%
6	Metal Forming Die Construction	68.0%	24.0%	6.0%		2.0%	92.0%
5	CNC Manual Part Programming	68.0%	22.0%	10.0%			90.0%
19	The ability to think analytically and logically	56.3%	33.3%	6.3%	4.2%		89.6%
15	Gaining a broad general education about different fields of knowledge	47.9%	41.7%	10.4%			89.6%
9	Plastic Mold Construction	64.0%	24.0%	8.0%	2.0%	2.0%	88.0%
8	Introduction to Material Science	40.0%	40.0%	18.0%	2.0%		80.0%
16	Writing clearly and effectively	25.0%	54.2%	12.5%	6.3%	2.1%	79.2%
18	Developing values and ethical standards	20.8%	47.9%	20.8%	4.2%	6.3%	68.7%
17	Acquiring proficiency with the use of personal computers	29.2%	37.5%	16.7%	10.4%	6.3%	66.7%
10	Scientific Understanding	26.0%	26.0%	38.0%	6.0%	4.0%	52.0%
13	Social Awareness	6.0%	24.0%	36.0%	18.0%	16.0%	30.0%
12	Cultural Enrichment	10.0%	16.0%	40.0%	16.0%	18.0%	26.0%

Summary of Data--Manufacturing Tooling Program
1998

Advisory Committee: N=5

	To what extent does a graduate require the course knowledge? To what extent do you feel the MFGT program prepares graduates for success?	To a Great Extent	Somewhat	Neutral	Very Little	Not at All	Combined A and B
1	Metal Removal I	100.0%					100.0%
2	Machinery handbook Calculations	60.0%	40.0%				100.0%
3	Blueprint Reading and Analysis	100.0%					100.0%
4	Metal Removal 2	100.0%					100.0%
5	CNC Manual Part Programming	80.0%	20.0%				100.0%
6	Metal Forming Die Construction	100.0%					100.0%
7	CAD/CAM for CNC Machining	80.0%	20.0%				100.0%
8	Introduction to Material Science	40.0%	60.0%				100.0%
9	Plastic Mold Construction	60.0%		20.0%	20.0%		60.0%
10	Scientific Understanding	60.0%	20.0%	20.0%			80.0%
11	Mathematics: Intermediate Algebra & Numerical Trig	80.0%	20.0%				100.0%
12	Cultural Enrichment	20.0%	20.0%	40.0%		20.0%	40.0%
13	Social Awareness	0.0%	60.0%	40.0%			60.0%
14	Overall Technical Training	100.0%					100.0%
15	Gaining a broad general education about different fields of knowledge	66.7%		33.3%			66.7%
16	Writing clearly and effectively	0.0%	66.7%	33.3%			66.7%
17	Acquiring proficiency with the use of personal computers	0.0%	66.7%			33.3%	66.7%
18	Developing values and ethical standards	0.0%	66.7%	33.3%			66.7%
19	The ability to think analytically and logically	100.0%					100.0%
20	The ability to learn on your own, pursue ides and find information you	100.0%					100.0%
21	How effectively did the FSU Manufacturing Tooling program prepare you for employment?	100.0%					100.0%

					Advisory Committee N=5
22		Do you think a 4 yr. BS Tooling Engineering program at FSU would be beneficial to industry and our students at FSU?			
	a	Yes			66.7%
	b	No			
	c	Not sure			33.3%

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology
Labor Market Analysis

MESA Michigan Employment Security Agency 1997

EMPLOYMENT - TOOL AND DIE MAKERS

Tool and die makers held about 142,000 jobs in 1994. Most worked in industries that manufacture metalworking machinery and equipment, motor vehicles, aircraft, and plastics products. Although they are found throughout the country, jobs are most plentiful in the Midwest and Northeast, where many of the metalworking industries are located.

NATURE OF THE WORK

Tool and die makers are highly skilled workers who produce tools, dies, and special guiding and holding devices that are used in machines that produce a variety of products from clothing and furniture to heavy equipment and parts for aircraft.

Toolmakers craft precision tools which are used to cut, shape, and form metal and other materials. They also produce jigs and fixtures (devices that hold metal while it is bored, stamped, or drilled) and gauges and other measuring devices. Diemakers construct metal forms (dies) that are used to shape metal in stamping and forging operations. They also make metal molds for diecasting and for molding plastics, ceramics, and composite materials. In addition, tool and die makers may repair worn or damaged tools, dies, gauges, jigs, and fixtures, and design tools and dies.

Tool and die makers must have a much broader knowledge of machining operations, mathematics, and blueprint reading than most other machining workers. They use many types of machine tools and precision measuring instruments and must be familiar with the machining properties, such as hardness and heat tolerance, of a wide variety of common metals and alloys.

Working from blueprints or instructions, tool and die makers plan the sequence of operations necessary to manufacture the tool or die. They measure and mark the pieces of metal that will be cut to form parts of the final product. They then cut, bore, or drill the part as required. They also check the accuracy of what they have done to ensure that the final product will meet specifications. Then they assemble the parts and perform finishing jobs such as filing, grinding, and smoothing surfaces.

Modern technology is helping to change tool and die makers' jobs. Firms commonly use computer aided design (CAD) to develop products. Specifications from the computer program can then be used to develop designs electronically for the required tools and dies. The designs can then be sent to computer numerically controlled (CNC) machines to produce the die. Programs can also be electronically stored and adapted for future use. This saves time and increases productivity of the workers.

In shops that use numerically controlled (NC) machine tools, tool and die makers duties may be slightly different. For example, although they still manually check and assemble the tool or die, each of its components may be produced on an NC machine. In addition, they often assist in the planning and writing of NC programs.

WORKING CONDITIONS

Tool and die makers usually work in tool rooms. These areas are quieter than the production floor because there are fewer machines in use at one time. Machines have guards and shields that minimize the exposure of workers to moving parts. Tool and die makers, however, must follow safety rules and wear protective equipment, such as safety glasses to shield against bits of flying metal and earplugs to prevent against noise. They also may be exposed to hazardous lubricants and cleaners. In addition, they spend much of the day on their feet and may do moderately heavy lifting.

Companies employing tool and die makers traditionally operate one shift per day. However, as the cost of new machinery and technology has increased, many employers now have more than one shift. Overtime and Saturday work are common, especially during peak production periods.

JOB OUTLOOK

Employment of tool and die makers is expected to decline through the year 2005. Nevertheless, job seekers with the appropriate skills and background should find excellent opportunities, as employers across the nation report difficulties in finding skilled workers to hire as tool and die makers. Many openings will be created each year by tool and die makers who retire. Three out of 10 tool and die makers are 50 years or older. As older workers begin to leave the occupation in larger numbers, employers in certain parts of the country may face more pronounced shortages.

The projected decline in employment reflects advancements in automation, including computer numerically controlled machine tools and computer aided design. CNC machine tools have made tool and die makers more productive ,while CAD has allowed some functions of these workers to be carried out by a computer and tool programmer. In addition, because precision metal products are a primary component of manufacturing machinery, increased imports of finished goods and precision metal products may lessen the demand for tool and die makers. These workers , however, are highly skilled and play a key role in the operation of many firms. This fact, coupled with a growing demand for

motor vehicles, aircraft, machinery, and other products that use machined metal parts, should help to moderate the decline in employment.

EARNINGS

Median weekly earnings for tool and die makers who worked full time were $660 in 1994. Most earned between $490 and $860 a week. Ten percent earned less than $380 a week, and the ten percent with the highest weekly earnings made more than $1,130. In addition to their hourly wage, most workers receive health and life insurance, a pension plan, paid vacations, and sick leave.

SOURCES OF ADDITIONAL INFORMATION

For general information about tool and die makers, contact: The Association for Manufacturing Technology, 7901 Westpark Dr.,. McLean, VA 22102. The National Tooling and Machining Association, 9300 Livingston RD., Ft. Washington, MD 20744. The Tooling and Manufacturing Association, ATTN: Education Department, 1177 South Dee Rd., Park Ridge IL 60068. Precision Metalforming Association, 27027 Chardon Rd., Richmond Heights, OH 44143.

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Labor Market Analysis

MANUFACTURING TOOLING A.A.S. PROGRAM

JOB TITLES OF MANUFACTURING TOOLING TECHNOLOGY GRADUATES

Skilled Trades**.....Tool and Die Maker – Stamping Dies**
Mold Maker – Plastic injection Molds
Tool and Die Maker – Jigs and fixtures
Machinist
Boring Mill Operator
Roll Maker
Layout Technician
Inspection Technician
Electrical Discharge Machine Operator
CMM Operator
CNC Operator
CMM Programmer
CNC Programmer
Set-Up Technician

Technical Engineering.....***Manufacturing Engineer***
Application Engineer
Application Specialist
Design Engineer
Industrial Engineer
Manufacturing Engineer
Mechanical Engineer
Project Engineer
Process Engineer
Product Engineer
Purchasing Engineer
Quality Control Engineer
Robotic Engineer
Tool Assembly Engineer
Tooling Engineer

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Labor Market Analysis

JOB TITLES Continued

Management**.....Account Manager**
Area Sales Manager
Assembly Supervisor
Cost Analyst
District Manager
General Manager
President
Project Manager
Plant Engineering Supervisor
Plant Manager
Program Manager
Quality Assurance Manager
Tool and Die Department Manager
Vice President
Vice President of Manufacturing

Sales.....***Sales Engineer***
Sales Representative
Technical Sales Representative

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology
Labor Market Analysis

COMPANIES THAT EMPLOY FERRIS STATE UNIVERSITY MANUFACTURING TOOLING GRADUATES

Acatus, MI

Acutex, MI

Aerotech Industries, MI

Aerotek Contract Eng. Services, MI

AIM, MI

Barth & Associates, Inc.

U.S. and International, FL

Beach Mold and Tool, Inc., IN

Bentler Industries, Inc., MI

BF Goodrich Specialty Chemicals, OH

Boos Products Gear and Eng., MI

Bremen Castings, Inc., IN

Brinks Tool & Die, MI

Burr Oak Tool & Gauge Co., MI

Catepillar, Inc., IL

Center Manufacturing, Inc., MI

Chivas Products Ltd., MI

Cincinnati Milacron, OH

COMPANIES THAT EMPLOY FERRIS STATE UNIVERSITY MANUFACTURING TOOLING GRADUATES

Circuit Control Corporation, MI

Claus, MI

Copeland Corporation, OH

Delta Tech Mold Inc., IL

Deroyal Industries, Inc., TN

Drawform, MI

Eaton Technologies Corp., MI

ENTEK Manufacturing Inc., OR

Enterprise Die & Mold Inc., MI

Evans Tool & Engineering, MI

Fabricor Inc., MI

Fawn Industries, MI

GM UAW Local 653 Union Hall, MI

Gordon Engineering, MI

Granby Mold, Inc., MI

Hanson Mold, Inc., MI

Hi-Tech Mold & Engineering, Inc., MI

Holland Wire Products, MI

HRU, Inc. Technical Resources, MI

Ironwood Plastics Inc., MI

K&M Machine-Fabricating, Inc., MI

COMPANIES THAT EMPLOY FERRIS STATE UNIVERSITY MANUFACTURING TOOLING GRADUATES

Knape & Vogt Manuf. Company, MI

Letica Corporation

Liberty Molds, MI

Lippert Components, Inc., MI

Luner Industries, MI

Makino, OH

Manutek, Inc., MI

MC Molds, Inc., MI

McDonnell Douglas Air Transport, OH

Metal Flow Corporation, MI

Michigan Scientific Corp., MI

Mid-West Instrument, MI

Midwest Machine, MI

Midland Industrial, OH

M&J Grinding & Tool Inc., OH

Modern Engineering Inc., MI

Monroe Inc., MI

Multi-Tek Die and Mold, MI

North Adams Mold Inc., MI

Northwest Tool & Die Co, Inc., MI

Nova Tool and Die, MI

Numerical Control Center Inc., MI

COMPANIES THAT EMPLOY FERRIS STATE UNIVERSITY MANUFACTURING TOOLING GRADUATES

Panduit Corporation, IL

Par Molds, MI

Pentavision Plastics, MI

Phillips Plastics Corporation, WI

PMC Machinery Sales, MI

Prestige, MI

Prince Corporation, MI

Progressive Industries Inc., MI

Proper Mold & Engineering Inc., MI

R & S Tool & Die, MI

Rapid Die & Engineering, Inc., MI

Rapid Die & Engineering Co., MI

Ronningen Research , MI

Ronningen Research & Dev., MI

Royal Oak Products Co., MI

Sacittarius Mold, Inc., S.C.

Sanford Rose Associates, IL
Spec Tool, MI

Superior Tooling Systems, MI

Tannervitz Quality, MI

Tannewhite, MI

Target Mold Corporation, MI

COMPANIES THAT EMPLOY FERRIS STATE UNIVERSITY MANUFACTURING TOOLING GRADUATES

Textron Corporation, MI

Toledo Molding & Die, Inc., OH

Tool Specialties, MO

Tool Specialties Co., MO

Transmatic, MI

Traverse Precision, MI

Tri Bulletin Tri Component Products Corp., NY

Wickman Corporation, MI

Woldring Plastic Mold Technology, MI

X-Rite Incorporated, MI

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Evaluation of Facilities and Equipment

Area	Meets Objectives	Limited Objectives	Not Possible to Meet Objectives	Comments or Concerns
Lab Location	X			
Lab Size (Sq. Footage)		X		Machinery too congested for Safety
Electrical Requirements	X			
Ventilation Requirements		X		- Surface grinding equipment ventilation is not adequate. - Smoke entering from the welding lab is a problem. - Noise level too high from welding vent fan.
Media Requirements		X		Multimedia equipment is needed in all lecture/lab areas. **
Lab Comfort Level (Heating & Cooling)		X		Controlled environment needed.
Handicap Access	X			
Tool Crib		X		Need Separate Areas for MFGT and WELD programs. **
Safety Zones Clearly Marked	X			
Adequate Fire Extinguishers	X			
Exits Clearly Marked	X			
Computer Lab		X		- Need Hardware and Software Upgrades. - Need Reliable computer support. - Need program specific lab for lecture/lab activities. **
Equipment Safety		X		Safety guarding needed for punch presses.
CNC Equipment		X		Hardware / Software upgrades needed for Hurco CNC Mills **
Faculty Office Computers		X		Desperately Need Hardware Upgrades. **

** Refer to Appendix D, Attachment 3 (Unit Action Plan)

MACHINES IN THE MANUFACTURING TOOLING LAB

Vertical Milling Machines	**18**
Horizontal Milling Machines	**3**
Engine Lathe	**12**
CNC Hurco Vertical Mills	**3**
CNC Lathes	**2**
Surface Grinders	**13**
EDM Ram or Sinker	**2**
EDM Wire	**1**
Band Saws	**2**
Cut Off Saws	**2**
Drill Presses	**5**
Plastic Injection Machine	**1**
Optical Comparator	**3**
CMM	**2**
Stamping Presses	**2**
Tool Pre-Setter	**1**

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology
Curriculum Evaluation

The Manufacturing Tooling Technology curriculum receive input from three distinct areas.

1. The program is reviewed on an annual basis by the faculty, alumni and the Advisory Board to insure industrial relevance. At the direction of the Advisory Board, the Manufacturing Tooling Technology program has been making gradual curriculum changes consistent with Industry standards that are applicable to industry needs.

2. Alumni of the Manufacturing Tooling Technology program were surveyed in 1988, 1991, 1994, 1995 and 1998.

Future Curriculum Revisions

1. An alternative delivery method needs to be developed to maintain continuity between lecture and lab content being team taught by different instructors.

At this time the curriculum is sound and no other additional changes are anticipated pending future input.

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Enrollment Trends Over the Past Five Years

Enrollment, Recruitment and Retention

A. *Enrollment Trends for the past five years.*

1. Student credit hours/FTE. (93 – 98)

93/94	94/95	95/96	96/97	97/98
323.03	312.74	268.48	314.58	294.00

2. Majors (on-campus and off-campus, separately).

93/94	94/95	95/96	96/97	97/98
42	27	36	62	68

Attachment 1, Appendix B
Student Enrollment Chart

Off Campus Activities:

MFGT 151 – Metal Stamping Process
Credit Hours: 2 (1 Lecture: 3 Lab) On Demand
Fall 1994 .....4 sections, Grand Rapids
Fall 1995 ..... 1 section, video taped
Fall 1996 ..... 2 sections, video taped
Summer 1997 .... 1 section, video taped

MFGT 153 – Die Construction and Repair
Credit Hours: 2 (1 Lecture: 3 Lab) On Demand
None

MFGT 251 – Die Tryout
Credit Hours: 2 (1 Lecture: 3 Lab) On Demand
None

MFGT 253 – Die Estimating/Project Management
Credit Hours: 2 (1 Lecture: 3 Lab) On Demand
Fall 1994..... 6 sections, Grand Rapids
Summer 1998.....2 sections, video taped

3. Graduates (on-campus and off-campus, separately).

93/94	94/95	95/96	96/97	97/98
19	12	7	9	20

Attachment 2, Appendix B
Enrollment/Graduate Comparison Chart

Note: There is currently no off campus degree option.

4. *Graduates employability (field of employment, starting salary).*

	93/94	94/95	95/96	96/97	97/98
% Placed	100%	100%	100%	100%	100%
Salary	Unknown	$25,155	$27,200	$28,118	$28,348*

Source: Ferris State University fact book.

***Please Note**: The above salaries represent starting income without overtime. Current industry requirements mandate a 54 hour workweek with an average income of $43,200.00 for 1998 MFGT graduates.

5. *Graduates promotability and advancement.*

Graduates enjoy outstanding career mobility. Alumni are located throughout the United States with the majority remaining in Michigan. Graduates are given advanced placement in many industrial apprenticeship programs.

6. *Program capacity.*

With current resources, the program can accept 40 freshmen. Targeted theoretical enrollment for the A.A.S. program is 70 students maximum, without adding additional staffing and resources. The current faculty positions are three (3) full time positions, and one (1) year temporary position.

7. *Accepts/enrollees ratio.*

The majority of applicants for the Manufacturing Tooling Technology A.A.S program meet acceptance criteria.
Acceptance for enrollment must meet the 2.0 grade point requirement; with a minimum of 15 ACT math score for admittance into the technical sequence.

B. *Recruitment*

1. *Describe recruitment activities in the program and how they are coordinated with those carried out by the College and the University.*

a. Faculty serve on the following boards.
   1. Industrial Scholarship Committee
   2. Members of the Ferris State Machinist Association
b. Faculty communicates with at least 20 high schools per year.
c. Faculty communicates with a minimum of 3 community colleges per year.
d. Faculty and Student Body Participate in Autumn Adventure.
e. Faculty and Student Body Participate in homecoming activities.
f. Faculty provides recommendations for student scholarships in excess of $40,000 in scholarships annually.

H & S offers $5000 annually
Paragon offers $9000 annually
Metal Flow offers $12,500 annually
Transmatic offers $15,000 annually

g. Faculty along with the Ferris State Machinist Association, participate in recruiting activities and presentations to area high schools and technical career centers.

2. *Describe interest in the program, eg, number of applicants compared with program capacity.*

For the 1997/98 academic year the Manufacturing Tooling Technology Program A.A.S. was at capacity for incoming freshmen.
Interest for the program is measured by two methods, first are Ferris State University interest cards distributed by the office of admissions, which provide a student prospect list. Second, student enrollment that is displayed on the QUOTTECMFT, screen 107 FSU-SIS+.

Attachment 3, Appendix B
Interest Card
Attachment 4, Appendix B
QUOTTECMFT Screen Print

The Manufacturing Tooling Technology Program participates in the university articulation program. For the 1999 fall semester, 22 students have submitted notices of intent to participate. Thirty-two (32) students have selected the Manufacturing Tooling Program as their preferred major, 49 students have completed their service cards, and 49 students are listed on the prospective list.

C. *Retention.*

1. *Are there any identifiable retention problems associated with the program?*
Yes. The loss of students to industry prior to graduation is always a concern.

2. *What efforts are being exerted to resolve retention issues? Assess program achieved in this area.*
The program enjoys one of the highest retention rates on campus because of the academic program course content , and the faculty is commitment to the students and providing solid academic counseling.

3. *Describe activities of program-related student organizations.*
Many students who major in the Manufacturing Tooling Technology Program belong to the Ferris State Machinist Association (FSMA) student chapter. Technical speakers from industry, plant tours, and trips to machine tool conventions are activities that take place throughout the year.

4. *Describe the involvement of the faculty on student advising.*
Each of the program faculty are assigned student advisees during enrollment. Students meet with faculty a minimum of once per semester to monitor and build a schedule.

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology
Program Productivity/Cost

B. Instructional Resources

1. *Describe, in general, the facilities (classroom, lab, clinic, etc.) and equipment available to the program.*

   The Manufacturing Tooling courses utilize multiple laboratory areas: the major laboratory for hands on course work consisting of metal removal, CNC machining and programming, die construction, and mold building. A computer lab is available to the Manufacturing Tooling students. The computer lab is exclusively designed and maintained by the Manufacturing Tooling Technology program.

2. ***Supplies and expense budget***

   Supplies and expense budget for past five academic years.

92/93	93/94	94/95	95/96	96/97
$20,266*	$17,995*	$13,368*	$17,508*	$26,994*

   * Note amounts are actual funds spent not reflective of formulated budget.

3. *Equipment acquisition budget*

   Equipment acquisition budget for past five academic years.

92/93	93/94	94/95	95/96	96/97
$10,500*	$53,700*	$6,793*	$7,900*	$13,500*

*Voc. Ed. Dollars are no longer a source of revenue because of restrictions and program phase-out.

4. *Gifts and Grants*

   Gifts, Grants, and Consignments for past five academic years.

93/94	94/95	95/96	96/97	97/98
$29,689*	$55,795*	$79,203*	$113,759*	$131,849*

*Includes steel donations, consumable donations, equipment gifts and consignments.

Attachment 1, Appendix C
A list of Donations

5. *Travel budget (faculty and administration, separately)*

   Travel Budget for 1997/98 was $3168.00. Funds were provided from Manufacturing Tooling Local account.

   Please note: Funding is not provided by the university.

6. *Professional development, other than travel, budget*

   Professional Development for 1997/98 was $400 per faculty member.

7. *Library resources*

   Library Resources are appropriate with full access for faculty and students.

C. *Describe faculty activities other than instruction, eg.*

Faculty Activities (Past five years)

1. *Committee involvement: program, department, college, university, state, and national levels.*

   Each faculty member serves on department, college, and university committees.

   Attachment 2, Appendix C
   Faculty Committee Participation

2. *Professional organizations*

   The faculty are actively involved in the Society of Manufacturing Engineers, Fabricating Manufacturing Association, and the National Tool and Machine Association at the chapter, district, and national levels through committee membership and convention attendance. Membership in the Society of Manufacturing Engineers, American Association of Engineering, and the Precision Metal Forming Association.

3. *Publications*

   Occasional articles about the program have been published.

4. *Consulting*

   All faculty members are actively involved in consulting on a continual basis in part to keep their expertise relevant for the students. Automated and conventional machining training, and engineering activities are typical forms.

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Conclusions

Effectiveness of the program.

A. *Curriculum.*

1. *What are the graduation requirements?*
   See attached check sheets. **Attachment 1, Appendix D Curriculum Check Sheet**

2. *Include a suggested semester-by-semester sequence of courses to be completed.*
   See attached check sheets. **Attachment 2, Appendix D Course Sequence Check Sheet**

3. *Comment on the currency of the curriculum with respect to the present and future expectations from the graduate at the workplace.*
   Please review Employer, Alumni, Advisory Board Survey. **Refer to Section 2, 3, 6 Employer, Alumni, Advisory Board Survey**

B. *Quality of the program.*

1. *In what ways can the quality of the program be demonstrated (accreditation, success rate in licensure exam, recognition by others, ect.)?*
   The Manufacturing Tooling Technology program enjoys one of the best placement rates and highest average starting salary. Many metal forming related manufacturers in Michigan provide support for the program with much of the materials and equipment required.
   Students are awarded advanced standing in companies' apprentice programs, and quantify for more than 50 percent of the required 8000 hours of practical experience and application. Students are also awarded 100 percent credit toward theory and class room requirements.

2. *What approaches are utilized to enhance the quality of instruction?*
   Constant pursuit by the faculty of additional degrees and attendance at workshops, seminars, expositions, and utilization of industrial advisory boards.

3. *How is student performance assessed?*
   Examinations, quizzes, term papers, laboratory projects, reports, oral presentations, and student portfolios.
   Student performance is assessed by pretests for incoming students, and post testing for out going graduates is also administered.

4. *How is the quality of instruction measured?*
   Student Evaluations, Peer Evaluations, Alumni Evaluations and Industrial Advisory Board Evaluations. **Refer to Section 2, 3, 6 Employer, Alumni, Advisory Board Survey**

5. *How are the course contents kept current?*
   Annual Advisory Board program review, industry input, annual alumni surveys, employer feed back and faculty professional development.

6. *How is the success of graduates gauged?*
   Initial employment in their field, salaries, career standing, and annual Alumni surveys.

C. *What are the strengths and weaknesses of the program?*

Advantages

1. A unique program, that covers all aspects of the metal removal, metal forming, and mold making.
2. Very high demand vs. supply of graduates.
3. Strategic asset to the Michigan and Great Lakes regional economy. Autos, appliances, furniture, etc.
4. A very high level of industrial support.
5. Scholarship support from industry.
6. A high level of laboratory content which is the competitive advantage.

Disadvantages

An inadequate capital equipment supply and faculty development budget. The program is at risk because of its extreme dependence on the private sector without a University developed plan.

Insufficient support for recruiting activities. **Attachment 3, Appendix D Unit Action Plan**

COLLEGE OF TECHNOLOGY
Manufacturing Tooling Technology

Recommendations

Actions taken and future prospects

A. Assessment of actions taken

1. What measures have been taken to correct weaknesses and to emphasize strengths of the program?

It is anticipated that with new leadership and organization in the College of Technology, a solid program-based financial plan will be implemented. Solicited donations from industry along with the formation of an endowment fund with the goal to become self sufficient.

2. What are the results in response to the measures executed?

To date, administrative cost reduction and initial recognition of program financial constraints.

B. Future measures needed to enhance the program.

1. What are the environmental factors which pose threats or present opportunities for the program (eg. political, cultural, economic, fiscal, administrative, organizational, curricular, technical, social)?

a. What impact will these factors have on the program?

1. Enrollment
2. Quality of program
3. Impact of the future focus/direction of the program

b. What additional measures should be instituted to enhance the program?

With a lack of funding for capital equipment, supplies and expenses and faculty development, the faculty go to the private sector for donations and consignments. The program has been very successful in obtaining gifts. Revised budgets for equipment, supplies and faculty development; along with a formalized gift and donation strategy need to be developed and nurtured internally and externally to the University (formal long-term industrial partnerships).

Because the manufacturing tooling technology curriculum supports numerous programs within the college of technology, this program should be reviewed for possible expansion. If enhanced, the Manufacturing Tooling Technology Program has the potential to increase enrollment and produce additional graduates aggressively sought by industry. This high demand for FSU Manufacturing Tooling Technology graduates continues to draw students to our campus.

Budgeting for the program should be established to include:

- Establishment of an annual capital equipment replacement / upgrade fund of $20,000.
- Development of a university / industrial partnership for long term machine tool capital equipment replacement and upgrades.
- Establishment of an annual faculty development fund of $1,500 per faculty.
- Increase the number of tenure track faculty from 3 to 5 by converting the current one year temporary position to a tenure track and adding one additional tenure track position to cover the current required FTE loads. (98 FTE = 5.15, 97 FTE = 5.30, 96 FTE = 5.25)
- A one time upgrade for MFGT faculty office computers of $15,000.

Each of the above should be reviewed and adjusted annually to reflect inflation, enrollment, and technological change. This will insure a state-of-the-art, hands-on, highly regarded machine tool technology program.

A number of possibilities exist for new curriculum initiatives in the Manufacturing Tooling Technology area. These include the development of a four-year BS degree program in tooling engineering technology. Possibilities should be explored for hybrid programs, such as manufacturing tooling and technical drafting and tool design, manufacturing tooling and plastics, manufacturing tooling and manufacturing engineering, and so forth.

The following program initiative should be funded to improve efficiency, productivity and enhance enrollment:

Project Description: "Technology 2000"

The "Technology 2000" project is a concept of the Manufacturing Tooling Technology program faculty, designed to investigate feasibility, develop where appropriate, and present when applicable, MFGT technical course content using alternative delivery methods involving multimedia and world-wide-web techniques for the purpose of enhancing enrollment, improving efficiency, and increasing program productivity.

If successful, this project has the potential of delivering quality instruction world wide, while improving on campus efficiency, and increasing the student population by reaching areas unreachable any other way.

Goal:

Evaluate the current MFGT checksheet for courses or course content, which could be effectively delivered by other than conventional methods. Develop these modules or courses and provide a mechanism to deliver them to a diverse student population.

Benefits:

This project would provide more efficient on campus delivery of technical course content where feasible, provide additional resources for student achievement and success, both on and off campus, and expand potential program growth that could not be achieved any other way. The following demonstrate just a few of the areas for enhancement, enrichment, or program growth:

BENEFIT	POPULATION
Self Enrichment	Everyone
Technical Skill Building	Industry
Certificate Achievement	Business/Industry (for job advancement)
Remediation	Pre-Technical Student
Advanced Placement	High School / Career Technical Student Math/Science/Technology Student
Exploration	Everyone
Career Exploration	Non-Traditional Student / Industry
Optional Content Delivery Forum	Credit hour students on and off campus (Potential for splitting lecture/lab courses)
Content Review Method	Credit hour students on and off campus
Apprenticeship Theory	Industrial Partnerships
Program Awareness	Administration / Staff / Faculty

The resources required can be categorized in three phases.

Phase I (Development)

Resources Required:

-- Faculty salary stipend (3 faculty X $16,000 ea.)	$48,000
-- 5 Advanced level multimedia desktop computers	$25,000
-- DVD CD writer	$ 5,000
-- Video Camera	$ 2,500
-- Desktop Scanner	$ 500
Total for phase I	$81,000

Phase II (On campus delivery)		
Resources Required:		
-- 5 Laptop Computers (Recommended Program faculty strength)		$20,000
-- 5 Projection Systems for Multimedia Delivery		$25,000
-- Multimedia cart with computer, VCR, and display		$ 6,500
-- Mini-Cam display device		$ 2,500
-- Laser Printer (color)		$ 5,000
-- Color Plotter		$ 7,500
-- Overhead monitors with mounts (3)		$ 4,500
	Total for phase II	$71,000
Phase III (Off campus delivery)		
Resources Required:		
-- Computer Server		$ 5,000
-- Token Ring or equivalent hookup		$ 5,000
-- Web site development		$ 7,500
-- Marketing		$10,000
	Total for phase III	$27,500
	Grand Total	$179,500

To complete phase II and phase III, two classrooms of appropriate size and location will need to be dedicated or constructed for the project.

Once completed, this project could serve as a "boiler-plate" for other programs on campus, providing a mechanism for similar enhancement or growth. In comparison, industry currently charges between $100,000 and $200,000, on average, for development of a single module. Units within a module cost between $20,000 and $80,000. Therefore, a single module consisting of just seven units would cost roughly somewhere between $140,000 and $560,000. The FSU/DME project with seven modules and only simple animation we understand cost in excess of $300,000 to develop. The FSU/HVAC project for a single module cost around $120,000 to develop and required about two years to put together.

A project of this nature requires a foundation of three basic components. First, a commitment by the subject matter expert (faculty) to devote the time and energy necessary to develop the content. Second, project funding to supply the necessary resources and logistical support for the development process. Third, a positive optimistic synergy from administration, faculty, staff, and students acknowledging the benefits of such a project.

Appendix A

Attachment 1: Manufacturing Tooling Technology Resource Utilization Chart.

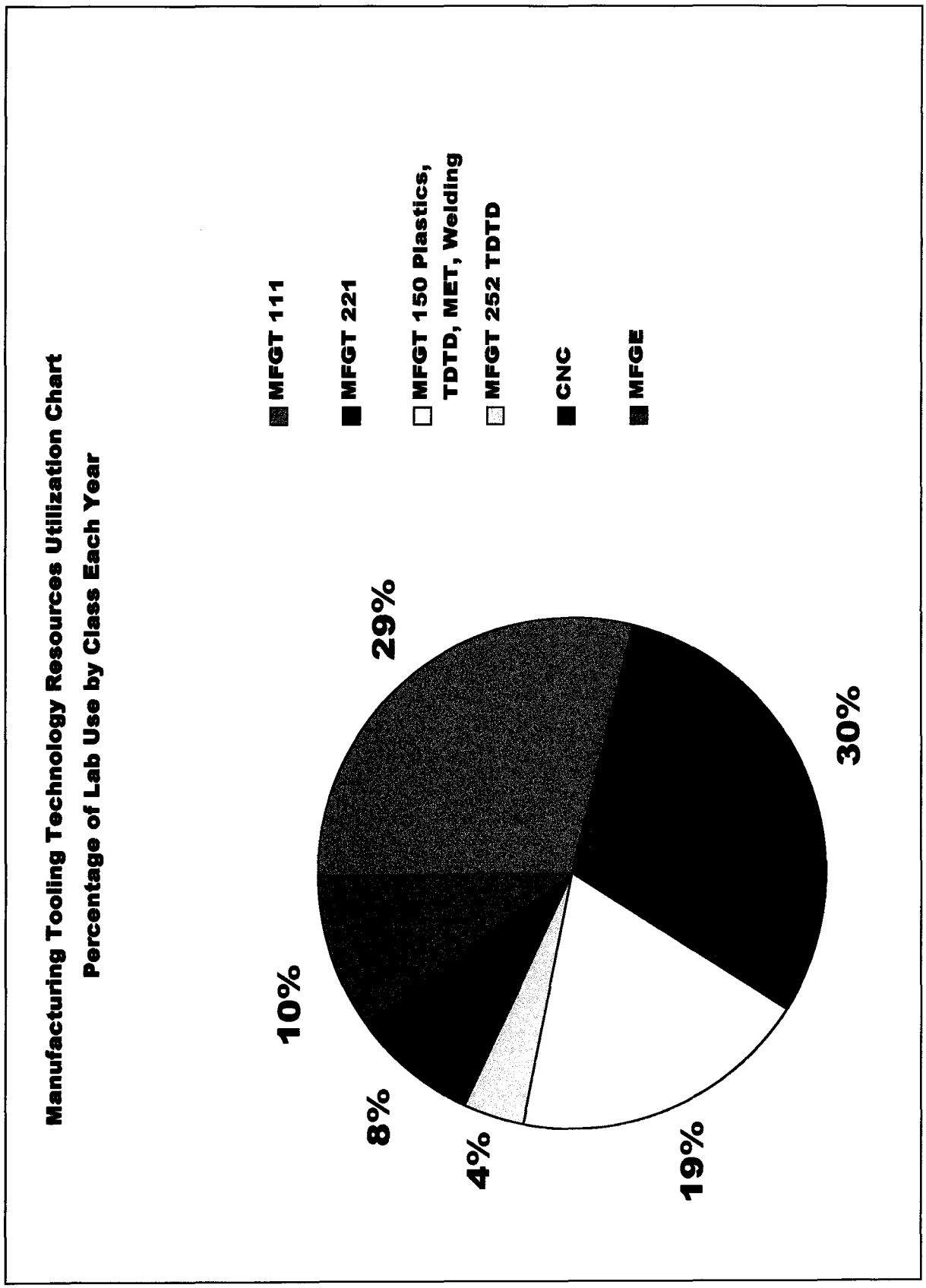
Attachment 2: Department of Labor Statistics Chart.

Attachment 3: Faculty and Staff Resumes.

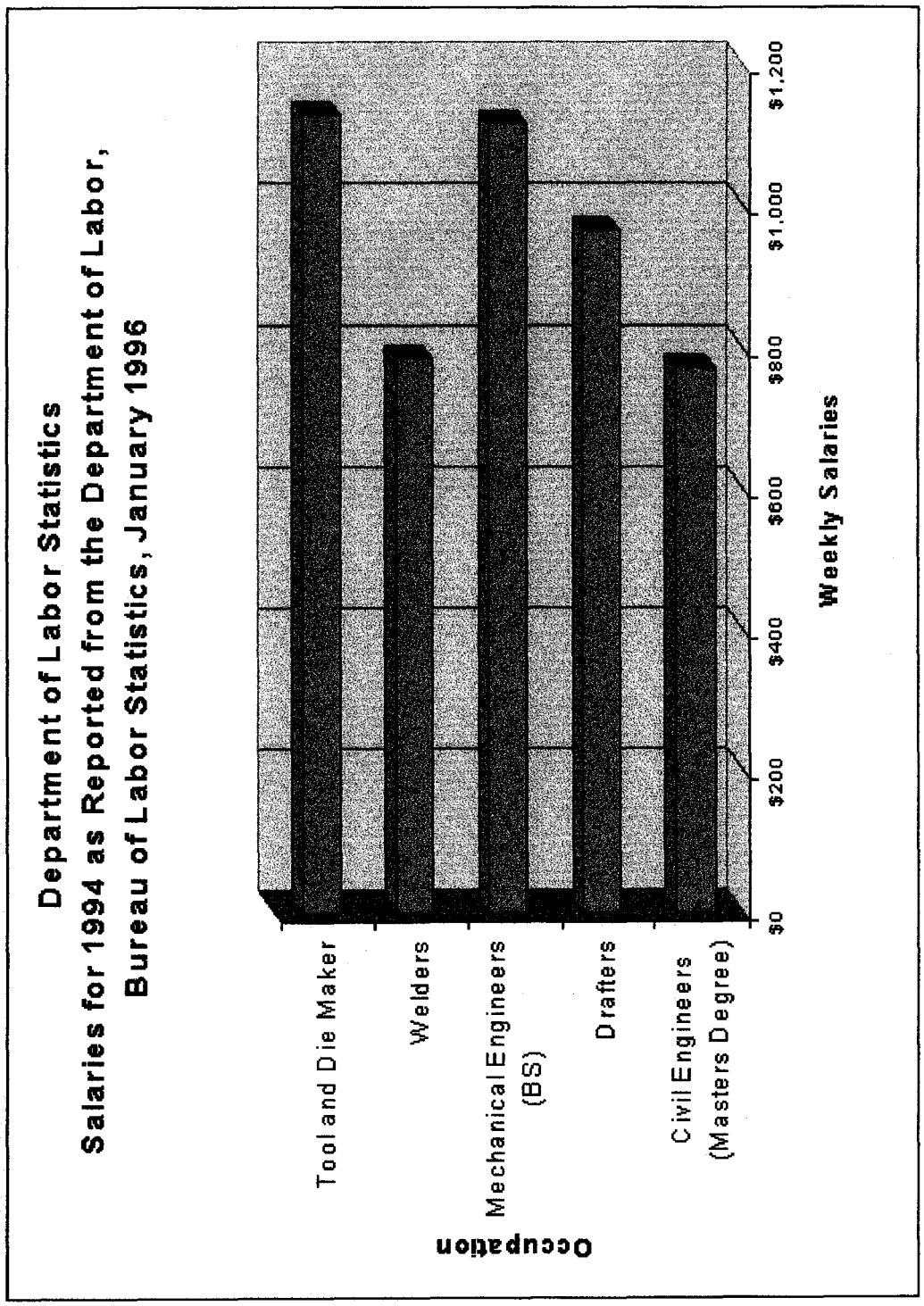
Attachment 4: Faculty FTE Overloads.

Attachment 5: Advisory Board Membership List.

Attachment 1



Attachment 2



Attachment 3

Resume:

Tenured/Tenure Track Faculty:
Dennis Finney
Jack Gregory
Louis J. Nemastil

One Year Temporary:
Paul Driggers

Technician:
Bruce Hammond

DENNIS FINNEY

Home Address
17680 McKinley Rd.
Big Rapids, Mi. 49307
(616) 796-70120

Campus Address
College of Technology
Swan 107
(616) 592-2651

EDUCATION: **Master of Arts Degree in Industrial Education 1979**
Eastern Michigan University, Ypsilanti, Mi.

Bachelor of Science in Education, June 1972
Ferris State University, Big Rapids, Mich.

Associate Degree in Machine Tool, March, 1970
Ferris State University, Big Rapids, Mich.

EMPLOYMENT: Assoc. Professor, Ferris State University, Big Rapids, MI.

1985 - present Tenured faculty in the College of Technology's Manufacturing Tooling Technology program of the Manufacturing Engineering Technologies Department

1994 – 1997 Developed and taught Machine Tool, Fundamentals of CNC, Apprenticeship math, and Machine Maintenance. Diesel Technology Co., Grand Rapids, Mi.

1997 Lectured for SME Society of Manufacturing Engineers "Fundamentals of Machine Tool"

1996 Developed and taught (TPM) Total Productive Maintenance course for Big Rapids Components, Big Rapids, Mich.

Dec. 1991 - May 1992 Research in Excellent Grant, Ferris State University, Big Rapids, Mi. "A Comparison of Traditional Electrical Discharge Machining Tool Construction Methods With Four Processes Using Stereolithographic Models.

May - Sept. 1989 Developed a machining process to machine chilled iron in lifters. Seal Power, Muskegon, Mich.

June - Aug. 1988 MRPC Ferris State University, Big Rapids, Mich.
CAD drawings and building of prototypes for analysis of new products.

June 1987 Paragon Mold and Die Corporation, Grand Rapids, Mi. Taught Paragon employees how to program new CNC controlled mills on existing jobs on the floor.

June - July 1986	**Prince Corporation, Holland, Mich.** Researched alternative ways of making graphite electrodes. Compiled information on copper compared graphite electrodes
1984 - 1985	**Washtenaw Community College, Ypsilanti, Mich. Vocational Machine Tool Instructor.**
1974 - 1985	**Pinckney Community Schools, Pinckney, Mich.** Organized and developed metals lab and courses including a Vocational Machine Tool Program.
Jan - June 1972	**Clare Intermediate School District, Clare, Mich.** Teacher of Vocational Machine Tool Course at Mid-Michigan Community College to bussed in area high school students.
Sept. 1970 - Mar.1971	**Brown's Machine Co., Beaverton, Mich.** Worked as a mold maker in the tooling department of this leading thermoforming plastics company.
April 1972 – Aug. 1974	
ACTIVITIES:	Senior Member of Society of Manufacturing Engineers - SME.

REFERENCES: Available upon request.

JACK L. GREGORY

Home Address
7448 N. Cypress Ave.
Big Rapids, MI 49307
(616)796-7044

Campus Address
College of Technology
Swan 109
(616)592-2651

EDUCATION:

Master of Science Degree in Occupational Education, Highest Distinction, May, 1993
Ferris State University, Big Rapids, MI

Bachelor of Science Degree in Manufacturing Engineering Technology, Distinction, May, 1992
Ferris State University, Big Rapids, MI

NOCTI(National Occupational Competency Testing Institute), Certificate, 1989
Ferris State University (MOCAC), Big Rapids, MI

EMPLOYMENT:

1990 - present — **Associate Professor,** Ferris State University, Big Rapids, MI
Tenured faculty in the College of Technology's Manufacturing Tooling Technology program of the Design, Manufacturing , and Graphic Arts Department.

1996 - present — **Associate Engineering Coordinator,** Diesel Technology Company, Grand Rapids, MI
Coordinate Engineering activities and special projects for the North American Operations group of Diesel Technology Company. Perform process evaluations, tooling and equipment studies, develop and implement pro-active improvements. Coordinate "trades" activities with special projects. Instruct engineering staff on tooling applications and real time problem solving.

1992 - present — **Education Development Facilitator,** Diesel Technology Company, Grand Rapids, MI
Develop and present special topics courses to PDE, PLD, NAO, Toolmakers, Apprentices, and other groups within the Diesel Technology Company organization. Including basic CNC, advanced CNC, g-code for toolmakers, machine tool theory and awareness, pre-apprentice shop mathematics, blueprint reading, and work instruction procedures.

1980 - 1990 — **Senior Programmer--Engineering Manager,** Benedict Mfg. Co., Big Rapids, MI Designed and detailed Jigs and Fixtures for job shop production use. Developed programs for NC and CNC equipment used for job shop metal removal processes. Supervised and performed equipment maintenance and repairs including: electronic, pneumatic, hydraulic, and mechanical. Developed and maintained computer databases to monitor and control: general maintenance, repair/replacement parts, carbide tooling, jigs and fixturing, and documentation of manufacturing equipment. Developed quality engineering standards for use by the Quality Control department. Served as contact for suppliers and customers as needed for: purchasing of tooling and equipment; certifying engineering standards; and development of new jobs and products.

1979 - 1980 — **General Foreman,** Benedict Mfg. Co., Big Rapids, MI
Scheduled workloads and employee vacations. Assigned personnel to machines. Inspected employee work areas to assure adherence to safety regulations and to verify performance of assigned duties. Conducted employee performance evaluations.

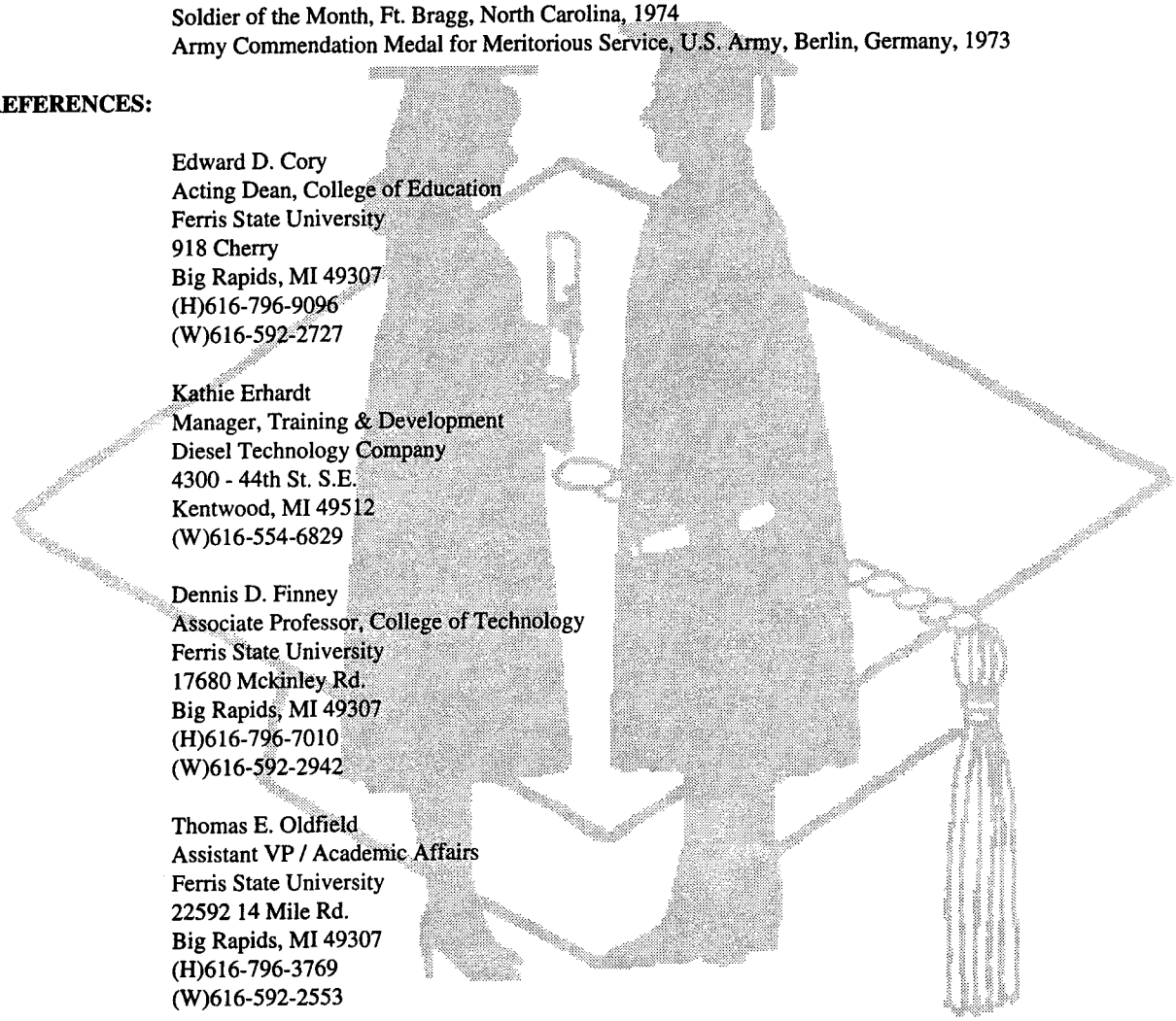
1974 - 1979 — **Production Machinist,** Benedict Mfg. Co., Big Rapids, MI
Fabricated numerous types of Jigs and Fixtures. Setup and operated various types of equipment including: Warner/Swasey CNC lathes, Cincinnati CNC mills, single and multiple spindle drills, vertical and horizontal mills, Gisholt engine lathes, Warner/Swasey 2AC and 3AC automatic chuckers; Performed light AC/DC welding and gas silver solder brazing.

1971 - 1974 — **U.S. Army**
Performed diverse duties including: State Department administrative liaison, military chauffeur for the American Ambassador to West Germany, warehouse operations supervisor and procurement assistant for U.S. Embassies in Moscow, U.S.S.R. and Warsaw, Poland.

ACTIVITIES: Senior member Society of Manufacturing Engineers MTA/SME.
Licensed aircraft pilot(single engine land.)

HONORS: Certified Manufacturing Engineer, Society of Manufacturing Engineers, June, 1992
Dean's list of Scholars, College of Education, Ferris State University, 1991
Certified Manufacturing Technologist, Society of Manufacturing Engineers, May, 1991
Soldier of the Month, Ft. Bragg, North Carolina, 1974
Army Commendation Medal for Meritorious Service, U.S. Army, Berlin, Germany, 1973

REFERENCES:



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LOUIS J. NEMASTIL

113 Park Avenue
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Hesperia, Michigan 49421
(616) 854-5015

CAREER OBJECTIVE

University-level educator with comprehensive knowledge and experience in the areas of tool and die design and development, sheet metal fabrication including roll forming methods, and manufacturing processes.

PROFESSIONAL PROFILE

Certified Vocational Educator with a B.S. in Trade/Technical Education. Offers fifteen years of comprehensive engineering and administrative experience with emphasis on the design and development of progressive dies, sheet metal development, and fixture design. Effective engineering and production liaison. Familiar with plastic injection molding processes, jig/fixture construction, and CNC programming. Well-developed interpersonal and communication skills enhance excellent technical abilities.

EDUCATION

B.S., Trade/Technical Education, Ferris State University, Big Rapids, Michigan.

A.A.S., Machine Tool, Ferris State University, Big Rapids, Michigan.
Certified Vocational Education Instructor, temporary.
Certified for grades 9-12, Vocational Training.
Certified for grades 7-8, all subjects.

Certified Tool & Die Maker
- Department of Labor, Bureau of Apprenticeship & Training.

CONTINUING EDUCATION:
- Completed Dale Carnegie Course, "Effective Speaking and Human Relations", 1992.
- Certified in Techniques of Problem Solving.
- Certified in SPC.
- Attends annual Progressive Die Design seminars. Certificates earned.
- Completed "Win-Win" negotiating seminar.

EMPLOYMENT HISTORY

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

Assistant Professor, Manufacturing Tooling Technology Program, College of Technology. Lead educator for the following courses: MFGT-211 Metal Forming Die Construction; MFGT-121 Metal Removal II; MFGT-252 Advanced Machine Tools. Requires extensive content research and preparation; 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.

EMPLOYMENT HISTORY (Continued)

Superior Metal Products, Corporate Tooling Division, Spring Lake, Michigan 1984-97

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 conception to implementation, of complete manufacturing lines using proper engineering methods and standards. Key player in initiating and maintaining corporate computer system. Functions as consultant and troubleshooter for twelve corporate divisions nationwide. Scope of responsibility and accountability increased greatly in final two years.

Bendix/Warner & Swasey Research Division, Solon, Ohio 1982-84

Manufacturing, design, and testing of all prototype sheet metal forming systems and tooling.

Reed City Tool & Die Company, Reed City, Michigan 1980-81

Implement theoretical knowledge into practical application.

IEM Corporation, Roger Heights, Michigan 1980

Tool & die construction.

Ferris State University, Big Rapids, Michigan 1980-81

Tutor for advanced machine tool students. Lab assistant for machine tool department.

Mount Pleasant Vocational Center, Mount Pleasant, Michigan 1981

Student teaching experience - basic machine tool (9th Grade) and advanced machine tool (11-12th Grades).

Hahn Manufacturing, Cleveland, Ohio 1979

Tool & die construction.

COMPUTER/SOFTWARE EXPERTISE

- AutoCAD for Windows.
- Bridgeport EZ-CAM and EZ-EDM.
- Windows 3.11 WFW networked.
- Lotus Smart Suite: Ami-Pro, 123, Approach, Organizer, Freelance Graphics.
- Electronic Library: Autodesk Mechanical Library, Dadco Library, Dayton Punch Library,
- Forward Industries Library, Interlakes Base Library, Textron Library.

ACCOMPLISHMENTS AND AFFILIATIONS

- Developed a new method of metal forming.
- President, St. Michael's School Board, Grand Rapids Diocese since 1988. Responsible for setting agendas; conducting meetings; setting budgets; coordinating and implementing programs and policies; motivating and encouraging in a proactive style.
- Mechanical Advisor for Science Olympia, St. Michael's School, Hesperia, Michigan.
- Administrator of grant monies, St. Michael's School, Hesperia, Michigan. Established educational program involving bridge design to enhance math and science curriculum.

Paul D. Driggers, Jr.

17160 Fifteen Mile Road Big Rapids, MI 49307 (616) 796-8175

Objective : Temporary Teaching Position in the Manufacturing Tooling Technology.

Highlights of Qualifications

* Twenty-one years work experience in manufacturing settings.
* Extensive background in industrial maintenance.
* Relevant associates and bachelors degree with eight years experience teaching vocational machine shop classes.
* Competent problem solver.

Relevant Experience

Maintenance

Broad Background in building and repairing equipment.
Demonstrated experience in preventive and predictive maintenance.
Programing experience; CNC and NC.
Adept in hydraulics and pneumatics.

Supervision and Leadership

Taught and Supervised machine tool technology adult community education classes for eight years.
Acted as a counselor and liaison as a union steward.
Lead man in maintenance department for six months.
Current and past area chairman for Ducks Unlimited.

Toolroom

Have designed and layed out toolrooms for best use of space and safety.
Proficient in the use of all toolroom equipment.
Have designed and built numerous machines, jigs, fixtures.

Work Experience

1990 - 1991 and 1994 - Present	**Toolmaker/Maintenance**	Tubelite,Inc. Reed City
1991 - 1994	**Toolmaker/Maintenance**	Kraftube,Inc. Reed City
1988 - 1990	**Concrete Construction**	Curtis Bro. Const. Big Rapids
1982 - 1987	**Toolmaker/Maintenance**	Fitzsimmons Manu. Big Rapids
1979 -1987	**Vocational Machine Shop Instructor**	Mt. Pleasant Public Schools

* Since 1974 have worked several part and full time jobs in a number of settings.

Education

Ferris State University, Big Rapids, MI
B.S., Trade technical Educational, May 1984
A.A.S., Machine Tool Technology, February 1974

References

Available upon request.

Bruce Hammond
19028 Arrowhead Lane
Big Rapids Michigan
49307
(616)796-9133

Education

*A.A.S. Manufacturing Tooling Technology, Ferris State University	
Expected Completion (evening classes)	5/99
*Statistical Process Control (SPC) Simonds Industries	6/90
* National Institute for Automotive Service Excellence (NIASE)	12/79

Employment

Ferris State University, Big Rapids Michigan — 1/5/95 to present

**Machine Lab Technician*

Responsibilities include servicing the Machine Tool, Graphic Arts, Plastic, and Welding labs for machine service, replacement, maintenance, consignment, and inventory. Management of University Tool Crib, housing welding consumables, and machine tool supplies. Scheduling and supervision of twenty one student workers. Procurement of donations and there appropriate duspersment. Providing yearly University fixed asset reports. Solicitation of donations. Minor and major machine trouble shooting and repair, in four major laboratories, as well as repairs for various University programs. Tour guide, and Adjunct teaching of up to six credit hours per semester. Oversee OSHA testing for lift truck licensing and lock out procedures. On Ferris State University ITAG Committee

Simonds Industries — 1980-1/5/95

**Engineering Technician*

Responsibilities included trouble-shooting process or machine problems. Scheduling preventative maintenance, purchase of new and used capital equipment and maintenance supplies. monitoring machine and process for compliance with OSHA safety standards. Tracking of corporate wide assets.

**Technical Sales Support Coordinator*

Responsibilities included customer service, Engineering/Sales development liaison. Job costing, design of processes. Launch of new products into manufacturing.

**Production Manager*

Responsibilities included supervision of five departments, and thirty employees. Production scheduling, inventory control, labor planning. SPC reporting and analysis and scheduling of preventive maintenance.

*cited in all evaluations for organization, attendance and cleanliness.

Skills

Experience in Hurco, and Fanuc Controls, Maintmizer Windows, Personal Designer, Dos, and Internet. Project Management oriented.

Interests

Hockey	Continuing Education	Antique auto restoration
Reading	Water-skiing	Fishing

References

Dr. Scott Whitener	Douglass Chase Jr.	Dennis Lerner
21255 Woodward Ave	1625 Harding	14642 190 Th. Ave
Big Rapids Michigan	Big Rapids Michigan	Big Rapids Michigan
49307	49307	49307

Attachment 4

MFGT 150 – Manufacturing Process
Credit Hours: 2 (1 Lecture – 3 Lab)

Faculty Loads (FTE)

	1998	1997	1996*	1995*	1994*
**D. Finney	1.00	1.00	1.00	1.00	1.11
**J. Gregory	1.00	1.00	1.00	1.11	1.11
G. Bolender***		0.50	1.00	1.00	1.13
T. Groner***					1.00
D. Chase		0.17			
R. Goodwin		0.92			
B. Hammond	0.17	0.17	0.25		
P. Driggers	1.09	1.00			
**L. Nemastil	1.00				
J. Littley	0.67				
P. Smania	0.17	0.50	0.58	0.08	0.33
T. Crandell		0.04			
*Other Faculty			1.42	1.18	
Total FTE	5.10	5.30	5.25	4.37	4.68

*Data supplied by administration (Ken Kuk, 3 Jun 98) as incomplete.

**MFGT Tenured/Tenure Track Faculty

*** Retired or Former Faculty

Manufacturing Tooling Technology
Scheduling Requirements
Prepared By: Kenneth A. Kuk
16-Oct-97

Course Number	Course Name	Lecture Hours	Laboratory Hours	Contact Hours	Credit Hours	Sections Required	Section Capacity	Section Productivity
Major Fall								
Mfgt 111	Removal 1	4	0	4	4	1	40	160
Mfgt 111	Removal 1	0	12	12	4	1	20	80
Mfgt 111	Removal 1	0	12	12	4	1	20	80
Mfgt 112	Handbook	3	0	3	3	1	40	120
Mfgt 211	Die Construction	4	0	4	4	1	40	160
Mfgt 211	Die Construction	0	12	12	4	1	20	80
Mfgt 211	Die Construction	0	12	12	4	1	20	80
Mfgt 212	CAD/CAM/CNC	3	3	6	4	1	20	80
Mfgt 212	CAD/CAM/CNC	3	3	6	4	1	20	80
Major Winter								
Mfgt 121	Removal 2	4	0	4	4	1	40	160
Mfgt 121	Removal 2	0	12	12	4	1	20	80
Mfgt 121	Removal 2	0	12	12	4	1	20	80
Mfgt 122	Manual CNC	3	3	6	4	1	20	80
Mfgt 122	Manual CNC	3	3	6	4	1	20	80
Mfgt 221	Mold Construction	4	0	4	4	1	40	160
Mfgt 221	Mold Construction	0	12	12	4	1	20	80
Mfgt 221	Mold Construction	0	12	12	4	1	20	80
Technical Related								
Mfgt 150	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150*	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150*	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150*	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150**	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150**	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150**	Mfg Processes	0	3	3	1	1	15	15
Mfgt 252	Adv. Machine Tools	3	3	6	4	1	20	80
Mfgt 252	Adv. Machine Tools	3	3	6	4	1	20	80
TOTALS	**TOTALS**	**43**	**150**	**193**	**93**	**37**	**840**	**2240**
FTEF/YEAR REQUIRED				**5.36**	**3.88**			
THEORETICAL PRODUCTIVITY SCH/FTEF				**418**				

*** Required for AAS Rubber Technology Winter 1999**
****Required for AAS Rubber Technology Winter 2000**

Attachment 5

Advisory Committee: Names and positions of the Manufacturing Tooling Technology Advisory Board members.

Gary Ackerman
Staff Engineer, Fabrication Tooling
Delco Electronics Corporation
One Corporate Center, PO Box 9005
Mail Station: 9151
Kokomo, IN 46904

Ray Brown
Model Die & Mold, Inc.
3859 Roger B Chaffee SE
Grand Rapids, MI 49507
616/243-6996

Doug Hislope
Supervisor, Manufacturing Equipment Design
Delco Electronics Corporation
3224 Davidson Rd.
Flint, MI 48556
810/257-5977

John MacMillan
Manufacturing Systems Manager
Drawform
500 Fairview
Zeeland, MI 49464
616/772-1910

Dave Sniegowski
Toolroom Supervisor
Prince Corporation
One Prince Center
Holland, MI 49423
616/394-6430

Joseph Tarajos
Supervisor, Metalworking Tech & Fasteners Materials Engineer
Chrysler Corporation
800 Chrysler Drive East,
CIMS 482-00-15
Auburn Hills, MI 48326-2757
810/676-7384

William Berger
Accu-tech Industries, Inc.
1354 New Hampshire
Marysville, MI 48090
810/364-8750

Art Hedrick
Training Coordinator
Synergis Technologies Group
3755 36th Street SE
Kentwood, MI 49512
616/956-0081, ext. 2025
616 475 3203 FAX

Keith Huck
Associate Manager, Quality & Training
Proper Mold & Engineering, Inc.
PO Box 3007
Centerline, MI 48015
810/779-8787

Ron Stendel
President
Tomco Tool & Die
807 Edna Street
Belding, MI 48809
616/794-1640

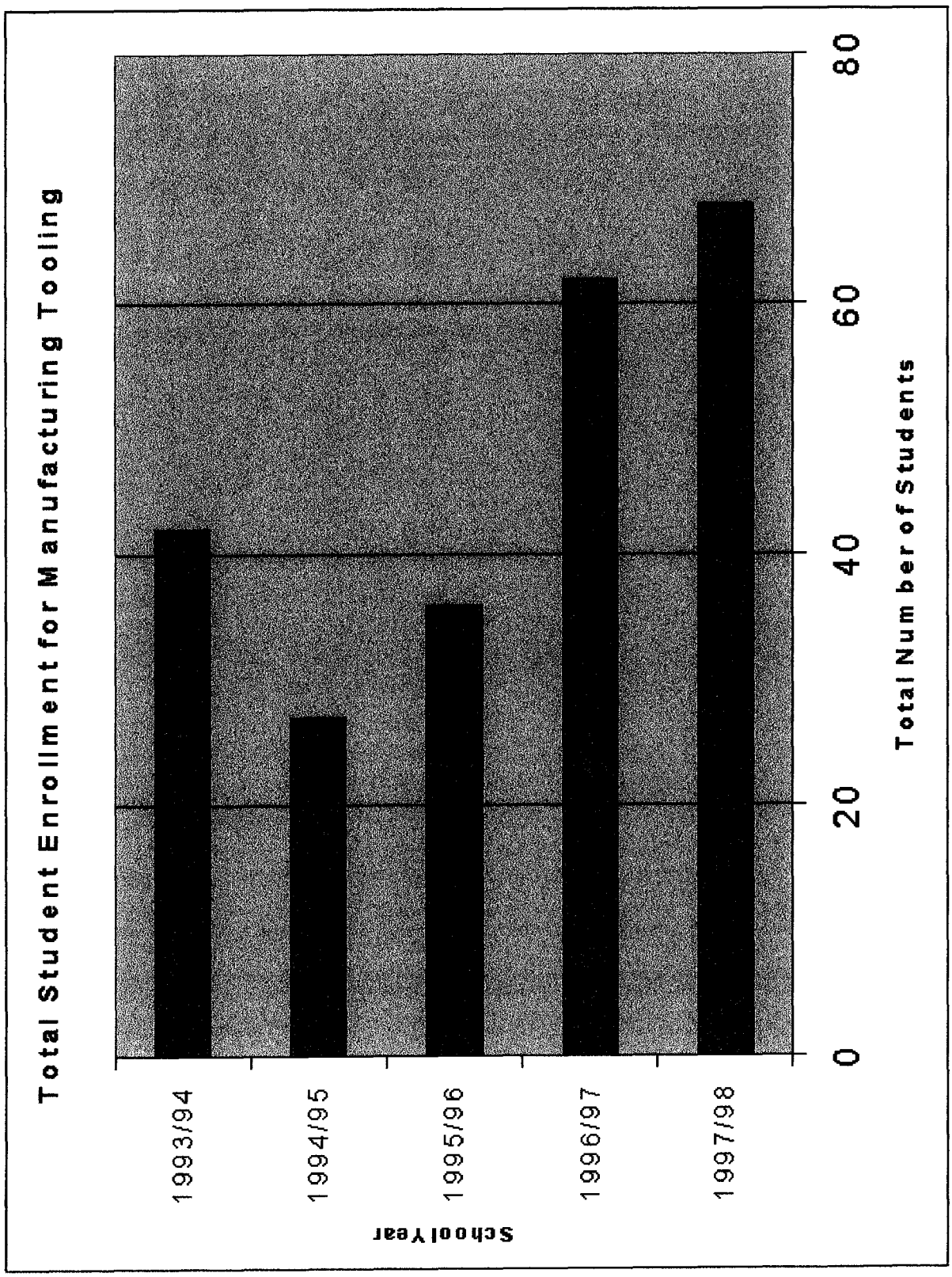
Appendix B

Attachment 1: Student Enrollment Chart

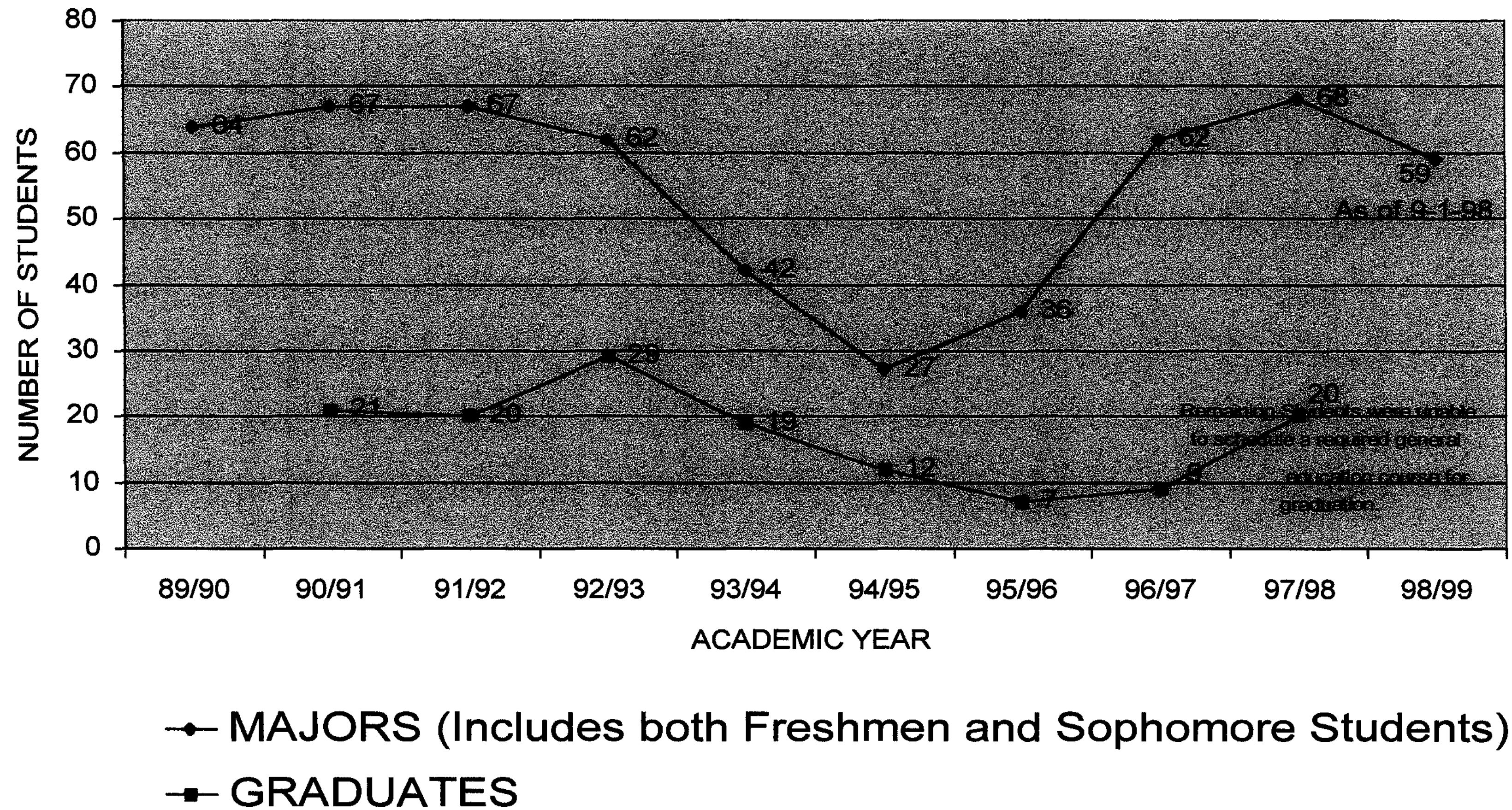
Attachment 2: Enrollment Graduate Comparison Chart

Attachment 3: Interest Card

Attachment 4: QUOTTECMFT Screen Print


Total Student Enrollment for Manufacturing Tooling
Total Number of Students
0
20
40
60
80
School Year
1993/94
1994/95
1995/96
1996/97
1997/98

MANUFACTURING TOOLING TECHNOLOGY MAJORS/DEGREES



Place
Stamp
Here

OFFICE OF ADMISSIONS
FERRIS STATE UNIVERSITY
420 OAK ST
BIG RAPIDS MI 49307-2020

Ferris State University Interest Card DEP

Please Print Clearly

Date_____

Name_____ Soc. Sec. No. (Opt.)_____/_____/_____

Address_____
Street City State Zip

Telephone (_____)_____ Have you applied? ☐ Yes ☐ No

Optional Data: Birthdate_____ Sex_____ Racial/Ethnic Data: ☐ American Native
☐ Asian or Pacific Islander ☐ Black (Non-Hispanic) ☐ Hispanic ☐ White (Non-Hispanic)

High School or College Currently Attending_____ Year of Graduation_____

Current Year **(Circle One)** F So Jr Sr Graduate Approximate GPA (4.0 Scale) _____

Date of Anticipated Enrollment: 19_____ ☐ **Fall** ☐ **Winter** ☐ **Summer**

Academic Program Interest (Please Complete)_____

Comments_____

W-Z0137 - SECURITY - YOU MAY NOT UPDATE ON THIS SCREEN

107 Class List TEC QUOTA CONTROL-MANUF TOOL TEC ADMISSIONS USE

Screen: ___ SID: _____ Course: QUOTTECMFT Term: 98F Fall Semester 1998

Line	Student Name	Student ID	Col	Cls	Maj	Registration Status
1	ADAMS, BRAD M	363-92-6222	TEC	FR	MFGT	Enrolled
2	ADAMSKI, CHRISTOPHER S	382-02-1481	TEC	FR	MFGT	Enrolled
3	BARBER, NICHOLAS H.	379-92-8962	TEC	FR	MFGT	Enrolled
4	BARKALOW, SCOTT H	374-02-3310	TEC	FR	MFGT	Enrolled
5	BOWERMAN, NATHAN A	379-98-1777	TEC	FR	MFGT	Enrolled
6	BROWN, BRIAN R	363-96-3442	TEC	FR	MFGT	Enrolled
7	CARROLL, MICHAEL J	365-92-6131	TEC	FR	MFGT	Enrolled
8	CHURCH, SPENCER S	367-04-9201	TEC	FR	MFGT	Enrolled
9	COUGHLIN, BRETT A.	378-96-4588	TEC	FR	MFGT	Enrolled
10	COX, NATHAN A.	377-86-5222	TEC	FR	MFGT	Enrolled
11	CRUMP, JERRY D, JR	367-92-3543	TEC	FR	MFGT	Enrolled
12	DEPEEL, JOHN M.	364-04-3631	TEC	FR	MFGT	Enrolled
13	DRENTH, KIMBERLY M	379-02-7666	TEC	FR	MFGT	Enrolled
14	EGAN, MARC P	378-98-3137	TEC	FR	MFGT	Enrolled
15	FELDPAUSCH, GARRETT	373-96-0165	TEC	FR	MFGT	Enrolled

W-Z0137 - SECURITY - YOU MAY NOT UPDATE ON THIS SCREEN
107 Class List TEC QUOTA CONTROL-MANUF TOOL TEC ADMISSIONS USE
Screen: ___ SID: _____ Course: QUOTTECMFT Term: 98F Fall Semester 1998

Line	Student Name	Student ID	Col	Cls	Maj	Registration Status
16	GIBBONS, DUSTIN	365-04-5086	TEC	FR	MFGT	Enrolled
17	GILBERT, ANDREW L	377-36-5005	TEC	FR	MFGT	Enrolled
18	GILBERT, JAMES B., III	363-86-7793	TEC	FR	MFGT	Enrolled
19	GORBY, BRANDON J	366-92-3188	TEC	FR	MFGT	Enrolled
20	HASSEVOORT, KELLI	380-86-6794	TEC	FR	MFGT	Enrolled
21	HILEWSKY, BLAIR J.	371-90-9479	TEC	FR	MFGT	Enrolled
22	JOHNSON, BENJAMIN P	378-98-5705	TEC	FR	MFGT	Enrolled
23	KENT, MATTHEW R	378-98-0062	TEC	FR	MFGT	Enrolled
24	KUHN, SPENCER C	369-86-9130	TEC	FR	MFGT	Enrolled
25	LADD, DARRICK K	381-86-3926	TEC	FR	MFGT	Enrolled
26	LINDNER, HOWARD L.	366-88-5876	TEC	FR	MFGT	Enrolled
27	MARCUS, DERRICK M	414-43-8508	TEC	FR	MFGT	Enrolled
28	NORTHUIS, ERIC J	366-98-3729	TEC	FR	MFGT	Enrolled
29	NURENBERG, WILLIAM G.	369-86-2977	TEC	FR	MFGT	Enrolled
30	PIROG, ANTONIO C	594-01-9718	TEC	FR	MFGT	Enrolled

W-Z0137 - SECURITY - YOU MAY NOT UPDATE ON THIS SCREEN
107 Class List TEC QUOTA CONTROL-MANUF TOOL TEC ADMISSIONS USE

Screen: ___ SID: _____ Course: QUOTTECMFT Term: 98F Fall Semester 1998

Line	Student Name	Student ID	Col	Cls	Maj	Registration Status
31	RIECK, MATTHEW R.	376-98-6198	TEC	SO	MFGT	Enrolled
32	SCHANCK, ANDREW L	364-04-9634	TEC	FR	MFGT	Enrolled
33	SEAMAN, JASON P	382-96-2443	TEC	JR	MFGT	Enrolled
34	SHEPPARD, JEFFREY P	378-02-5819	TEC	FR	MFGT	Enrolled
35	SPYKERMAN, FREDERICK	368-60-8091	TEC	SO	MFGT	Enrolled
36	STERKENBURG, BRIAN W	373-88-4555	TEC	FR	MFGT	Enrolled
37	TAYLOR, NICHOLAS C.	366-94-0654	TEC	JR	MFGT	Enrolled
38	TESTERMAN, ANDREW D	383-86-9420	TEC	FR	MFGT	Enrolled
39	VALLADE, JOSEPH W	378-84-2890	TEC	FR	MFGT	Enrolled
40	VINCENT, JASON T	366-88-8180	TEC	FR	MFGT	Enrolled
41	WALCOTT, MATTHEW S	385-94-8287	TEC	FR	MFGT	Enrolled

Appendix C

Attachment 1: A List of Donations

Attachment 2: Faculty Committee Participation

Manufacturing Tooling

Beginning July 1, 1997 Ending June 30, 1998	Manufacturing Tooling Donations for Fiscal Year 1997/1998 Date of Report: May 15, 1998 Prepared By: Sherry Hayes				Grand Total of Donations:		#$131,849.87#
Donor Name	**Rec'd**	**Description**	**Amount**	**Units**	**Unit Value**	**Units Total Value**	**Receipt #**
Trans-Matic Manufacturing	8/5/97	Stainless Steel Coil Material	6309.00	lbs.		$ 10,454.00	11666
Quinco Tool Products	8/27/97	Factory Seconds	20	lbs.		$ 500.00	11283
Draw Form Inc.	10/13/97	Small Dies	7	ea.		$ 700.00	11502
Anchor Lamina	10/14/97	Die Springs	50	ea.		$ 165.00	11498
G K Punch & Die	10/30/97	Piercing Punches	70	ea.		$ 613.16	11426
Hansen Balk Steet Treating	10/31/97	Heat Treating Service	-	-		Thank you sent - no value given.	
Sandvick Coromat Co.	11/25/97	Carbide				$ 1,715.68	11433
GKN Automotive	12/4/97	Comparator & Tumber	1	ea.		Thank you sent - no value given.	
Steelcase Equip. Recycle	12/8/97	OBI Press	45	ton		$ 17,000.00	11830
Drawform	12/8/97	Coils &	8	ea.		$ 16,423.82	11860
		Assorted Steel & Cold Rolled Steel				$ 3,875.00	
Trans-Matic Manufacturing	12/19/97	Coils	6	ea.		$ 5,104.00	11743
Gerry Bradley	12/1/97	$200.00				$ 200.00	Received From Alumni
Enterprise Die & Mold	1/5/98	Charmilles Andrew CNC	1	ea.		$ 25,000.00	11870
		Wire Burner					
		Die Springs	2	skids	$ 3,750.00	$ 7,500.00	11870
		Scrap Steel	4,640	lbs.		$ 2,784.00	11870
				Total for Page 1		$ 92,034.66	

Manufacturing Tooling continued

Donor Name	Rec'd	Description	Amount	Units	Unit Value	Units Total Value	Receipt #
AIM Tool & Die	2/2/98	Roll Around Carts	3	ea.		$ 500.00	11837
		Machinery	3	ea.			11837
Transmatic	2/19/98	Coil Steel	17,973	lbs.		$ 20,485.85	11852
AIM Tool & Die	3/4/98	Conveyors	3	ea.		$ 2,000.00	11722
		Welders	2	ea.			
		Coil Cradles	2	ea.			
		Air Compressor	1	ea.			
		Hand Truck	1	ea.			
Quinco Tool Products Co.	2/13/98	Miscellaneous Factory Seconds				$ 1,500.00	11850
Transmatic	2/28/98	Coil Steel	27,781	lbs.		$ 13,309.80	11853
PCS Company GR	3/24/98	208-GL Leader Pin	4	ea.		$ 195.40	11851
		SP5-62 Ejector Pin	14	ea.			
		SP7-82 Ejector Pin	20	ea.			
		SL17-6 Ejector Sleeve	1	ea.			
CIBA Specialty Chemical	3/26/98	Chemicals				$ 474.16	11854
Simonds Industries	4/16/98	End Mills				$ 150.00	Sent Thank You
Quinco Tool	5/4/98	Factory Seconds	28	lbs.		$ 1,200.00	11917
						$ 39,815.21	

Manufacturing Tooling

Beginning July 1, 1996
Ending June 30, 1997

Manufacturing Tooling Donations for Fiscal Year 1996/1997
Date of Report: August 1, 1997

Grand Total of Donations: $113,758.07

Donor Name	Rec'd	Description	Amount	Units	Unit Value	Units Total Value	Receipt #
Quinco Tool Products Co.	9/19/96	High spd end mill cuttg tools	175.00	ea.		$ 3,000.00	11258
Drawform	11/19/96	1 radial arm drill	1.00	unit	$ 4,000.00	$ 4,000.00	11263
Drawform, Inc.	12/19/96	cold rolled and stainless steel	19804.00	lbs.	see form	$ 25,813.23	11268
Kamp Oil Co.	1/22/96	Industrial lubricants	4.00	units	see form	$ 112.25	11272
Creston Industrial Sales	2/27/97	Text carbides	34.00	ea.	see form	$ 280.06	11277
Quinco Tool Products	3/13/97	End mills	27.00	lbs.	see form	$ 1,500.00	11281
Trans-Matic Corporation	3/31/97	Raw materials & misc. acces.				$ 46,415.43	11512
Synergis Technologies	4/3/97	Tool steel & equip. training	2150.00	lbs.		$ 6,950.00	11537
Kamp Oil	4/23/97	Industrial lubricants	55.00	gal.	$ 9.42	$ 518.10	11503
Chrysler Corporation	4/28/97	CNC Lathe	1.00	ea.		$ 25,000.00	11544
Kamp Oil	6/4/97	Industrial Lubricants	3.00	ea.	see form	$ 169.00	11558
						$ 113,758.07	

Manufacturing Tooling

Beginning July 1, 1995
Ending June 30, 1996

Manufacturing Tooling Donations for Fiscal Year 1995/1996
Date of Report: June 21, 1996

Grand Total of Donations: $ 79,203.76

Donor Name	Rec'd	Description	Amount	Units	Unit Value	Units Total Value	Receipt #
Sterling Supply Company	7/14/95	Cutting Fluid	1	Gal.	$ 2,320.00	$ 2,320.00	
Ciba Geigy Company	8/15/95	Solid Plastic	1	Pallet	$ 1,400.00	$ 1,400.00	
Drawform Incorporated	8/24/95	Brass Wire	30	Lb.s	$ 6.14	$ 184.00	11035
Sandvik Coromant Co.	9/14/95	Misc. Tooling	547	Ea.	$ 58.88	$ 32,205.00	11042
Drawform	11/29/95	Misc. Tooling	392.35	ea.	$ 1.00	$ 392.00	11041
Dennis Finney	12/14/95	Check for $70	70	ea.	$ 1.00	$ 70.00	
Kamp Oil Company	1/17/96	Lubricants	55.00	Gal.	$ 10.23	$ 563.00	11040
Dennis Finney	1/26/96	Check for $33	33.00	ea.	$ 1.00	$ 33.00	
Drawform	4/2/96	Air compressor, lights, sink, conveyor, bench, lockers	3275	ea.	$ 1.00	$ 3,275.00	11052
Jack Gregory	4/22/96	Check for $70; keys, photo, supplies, film, food	74.62	ea.	$ 1.00	$ 75.00	11039
Chrysler Corporation	5/8/96	8 tons of steel	35093.00	ea.	$ 1.00	$ 35,093.00	11053
Metal Flow Corp.	5/3/96	Tools for Scholarships	1837.13	ea.	$ 1.00	$ 1,837.00	11179
Kamp Oil Company	5/30/96	Citgo Sliderite	26.15	ea.	$ 1.00	$ 26.00	
Ciba-Geigy Corp.	6/12/96	4" REN shape solid plastic	1730.76	ea.	$ 1.00	$ 1,730.76	1198
						$ 79,203.76	

Manufacturing Tooling

Beginning July 1, 1994 Endingy June 30, 1995	Manufacturing Tooling for Fiscal Year 1994-1995 Date of Report: June 30, 1995 Prepared By: Sherry Hayes				Grand Total of Donations:	$ 55,795.60
Donor Name	**Rec'd**	**Description**	**Amount**	**Units**	**Unit Value**	**Units Total Value**	**Receipt #**
Carboloy Incorporated	8/24/94	Tooling Insert				$ 13,431.95	G10539
Drawform Incorporated	11/21/94	10 Skids of Steel				$ 14,901.67	G10543
Brinks Machine Company	12/30/94	Scrap Steel				$ 504.00	G10757
Jack Gregory	12/30/94	Film				$ 184.04	G10755
Lake City Forge	1/30/95	Graphite				$ 5,000.00	G10760
Drawform Incorporated	3/22/95	End Mills				$ 200.00	G10762
Drawform Incorporated	5/9/95	Carborundum M.				$ 69.10	G10764
Drawform Incorporated	6/27/95	Misc. Steel				$ 21,504.84	G10766
						$ 55,795.60	
				Total Page 1		$ 55,795.60	

Manufacturing Tooling

Beginning July 1, 1992
Ending June 30, 1993

Manufacturing Tooling Donations for Fiscal Year 1992/93
Date of Report: July 1, 1993

Grand Total of Donations: $ 29,689.16

Donor Name	Rec'd	Description	Amount	Units	Unit Value	Units Total Value	Receipt #
Kamp Oil Company	10/21/92	Citcool 33	55	gal.	$ 565.16	$ 565.16	11203
Lubecon Maintenance Sys	10/21/92	Drop L-Do's	100	ea.		$ 114.00	10202
Diacraft, Incorporated	11/11/92	CBN Grinding Wheel	1	ea.	$ 515.00	$ 515.00	10223
GTE Valenite Corporation	12/7/92	Obsolete and used tooling	1,000	ea.		$ 500.00	10224
General Electric Co.	2/3/93	Superabrasives Mach Adv.	1.00	ea	$ 7,995.00	$ 7,995.00	10206
		Software					
Delco Electronics	3/11/93	Injection Mold Dies	10.00	ea.		$ 20,000.00	10208
						$ 29,689.16	

Dennis Finney

Committee Participation
(department/college/university)

1991 - 1994 Secretary of the Department Curriculum Committee

1994 - 1998 Member of the Department Curriculum Committee

1993 - Library Liaison for Manufacturing Department

1993 Faculty Research Committee

1993 Chaperoned SME Society of Manufacturing Eng. students to Wis.

1992 - 1997 Served on Tenure Committee for Jack Gregory

1997 - 1998 Serving on Tenure Committee Louis Nemastil

1994 - 1998 Served as a technical resource to the SME Society of Manufacturing Engineers in the area of rapid prototyping.

1987 - 1998 Master Examiner for Michigan Occupational Competency Assessment Program

1997 - 1998 Advisor to the Ferris State Machinist Association

1996 - 1998 Advisor to the Newaygo Skill Center

1998 Special studies Wire Electrical Discharge Machine (2) two students participated.

1996 –1998 Mentored three faculty (B. Goodwin, P. Driggers, J. Littley)

Jack Gregory

Committee Participation (department/college/university)

Tenure Committee Member for Louis Nemastil (MFGT) and Tom Holland (MECH)

Program Faculty Mentor (1997 – 1998 for L. Nemastil)

College of Technology Promotion Committee Member (1998 – 2 year term)

College of Technology Curriculum Committee Member (1993 – 1998)

Computer Users Group Committee (1995)

Autumn Adventure / Homecoming Committee (1995)

Orientation Committee (1995)

CIM Cell Advisory Committee (1992 – 1994)

University Criterion II Committee (1992 – 1993)

MFGE Course Review Committee (1992 – 1993)

Department Integration Task Force Member (1991 – 1993)

Industrial Advisory Committee (1990 – present)

Paul Driggers

Committee Participation (department/college/university)

1997 – 1998 Advisor to the Ferris State Machinists Association

1997 – 1998 Advisor to the Traverse Bay Area Career Technical Center

Appendix D

Attachment 1: Curriculum Check Sheet

Attachment 2: Course Sequence Check Sheet

Attachment 3: Unit Action Plan

CURRICULUM REQUIREMENTS
MANUFACTURING TOOLING TECHNOLOGY
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER

TECHNICAL			CREDIT HOURS
MFGT	111	Metal Removal 1	8
MFGT	112	Machinery Handbook Calculations	3
MFGT	121	Metal Removal 2	8
MFGT	122	CNC Manual Part Programming	4
MFGT	211	Metal Forming Die Construction	8
MFGT	212	CAD & CAM for CNC Machinery	4
MFGT	221	Plastic Mold Construction	8
Technical Related			
MATL	240	Introduction to Material Science	4
TDTD	150	Blue Print Reading and Analysis	2

GENERAL EDUCATION			CREDIT HOURS
Communication Competence			
ENGL	150	English 1	3
ENGL	250	English 2	3
Scientific Understanding			
Elective			3
Quantitative Skills			
MATH	116	Interm. Algebra &Num. Trig.	4
Cultural Enrichment			
Elective			3
Social Awareness			
Elective			3

A.A.S. Degree Minimum General Education Requirements in Semester Hours:

Cultural Enrichment Credits - 3
Communications Credits - 6
Social Awareness Credits - 3
Scientific Understanding Credits - 3-4

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

MANUFACTURING TOOLING TECHNOLOGY
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER
Curriculum Guide Sheet

NAME OF STUDENT _____ STUDENT I.D.: _____

Total semester hours required for graduation: 68

NOTE: Meeting the requirements for graduation indicated on this sheet is the responsibility of the student. Compliance with this agreement will assure the student completion of the program in the time frame indicated. Your advisor is available to assist you.

			CREDITS	COMMENTS/GRADE
FIRST YEAR - FALL SEMESTER				
MFGT	111	Metal Removal 1	8	
MFGT	112	Machinery Handbook Calculations	3	
TDTD	150	Blue Print Reading and Analysis	2	
ENGL	150	English 1	3	
FIRST YEAR - WINTER SEMESTER				
MFGT	121	Metal Removal 2	8	
MFGT	122	CNC Manual Part Programming	4	
MATH	116	Intermediate Algebra & Numerical Trigonometry	4	
SECOND YEAR - FALL SEMESTER				
MFGT	211	Metal Forming Die Construction	8	
MFGT	212	CAD & CAM for CNC Machinery	4	
MATL	240	Introduction to Material Science	4	
____	___	Directed Science Elective	3	
SECOND YEAR - WINTER SEMESTER				
MFGT	221	Plastic Mold Construction	8	
____	___	Social Awareness Elective	3	
____	___	Cultural Enrichment Elective	3	
ENGL	250	English 2	3	
	OR			
ENGL	211	Industrial and Career Writing	3	

Program: Manufacturing Tooling Technology

Date: 12/01/95 (revised 11/03/96)

Prepared By: MFGT Program Faculty

GOAL 1.

To enhance enrollment and improve student retention in the program.

MAJOR ACTIVITIES AND PROCESSES:

- Increased advisor contact with students and additional student mentoring activities.
- Visit area High Schools and Vocational Technical Education Centers.
- Faculty will make personal contact with potential students by phone.
- Distribute recruiting videos to prospective students, parents, and counselors.

EXPECTED OUTCOMES:

- Eighty percent of the first year class will enroll for the second year of the program.
- Increase the number High School and VTEC students receiving information about the MFGT program and opportunities at FSU resulting in increased numbers of enrolled students.

INDICATORS/SOURCES:

- The retention rate (comparing the number of students enrolled in the 2nd year MFGT major at the start of the fall semester with the number of students successfully completing the 1st year MFGT major courses).
- Direct responses from telephone calls about enrollment status and education opportunities.
- Greater interest and on campus visits by High School and VTEC students.

REPORTING PROCESS:

- Status will be discussed by the program faculty and department administration.
- The institutional database SIS + will be used to report the statistics. This will be accomplished through the class list screen and class grade roster from SIS+.

RESOURCE REQUIREMENTS:

- Access to the institutional database SIS+ .
- Addition of a "Grade Roster by Class Screen" in SIS+ .
- Addition of a screen in the SIS+ system that lists any prospective student that has indicated the MFGT program as their 1st or 2nd choice on their interest cards or applications.
- FSU supported travel and faculty release time (1 day per week) to visit High Schools and Vocational Technical Education Centers.
- $1,000 in new funds annually to produce and distribute recruiting videos.

Manufacturing Engineering Technologies Department

Program: Manufacturing Tooling Technology

Date: 12/01/95 (revised 11/03/96)

Prepared By: MFGT Program Faculty

GOAL 2.

To produce graduates with the knowledge and skills necessary to enter the Manufacturing Tooling Technology profession.

MAJOR ACTIVITIES AND PROCESSES:

- Maintain the academic standards which must be met by students in order to progress sequentially through the required courses.

EXPECTED OUTCOMES:

- Students will meet the minimum requirements of each prerequisite course to advance to the next course in the sequence.

INDICATORS/SOURCES:

- Technical core course sequence will be in the form of a program check-sheet with prerequisites noted per course. This check-sheet will be maintained in the College of Technology Dean's office and will be revised and properly dated annually.

REPORTING PROCESS:

- Upon entering the MFGT program the student will be assigned a current check-sheet, which will establish the necessary requirements for their graduation.

RESOURCE REQUIREMENTS:

- Continued clerical and administrative support from the COT Dean's office.

Manufacturing Engineering Technologies Department

Program: Manufacturing Tooling Technology

Date: 12/01/95 (revised 11/03/96)

Prepared By: MFGT Program Faculty

GOAL 3.

To maintain the necessary resources for students to accomplish the required course-work activities.

MAJOR ACTIVITIES AND PROCESSES:

- Program faculty will devote approximately 15 hours per semester developing and maintaining industrial contacts and resources.

EXPECTED OUTCOMES:

- Contributions / Donations to the MFGT program for student use will be maintained and/or enhanced.

INDICATORS/SOURCES:

- Gift-In-Kind database.

REPORTING PROCESS:

- Status will be discussed by program faculty and department administration.
- An annual report will be generated from the department office itemizing the contributions / donations to the MFGT program.

RESOURCE REQUIREMENTS:

- Continued clerical and administrative support from the COT Dean's office.
- Continued clerical and administrative support from the MFGE Department office.
- FSU supported travel and faculty release time.

Program: Manufacturing Tooling Technology

Date: 12/01/95 (revised 11/03/96)

Prepared By: MFGT Program Faculty

GOAL 4. **To help students become active in professional organizations related to their curriculum.**

MAJOR ACTIVITIES AND PROCESSES:

- Students will be required to attend one of the professional society meetings held on campus.
- Students will be encouraged to attend "Machine Tool Shows" and events related to their profession.

EXPECTED OUTCOMES:

- Students will have more exposure and association with publications and professionals in their chosen career.

INDICATORS/SOURCES:

- Sixty percent of the MFGT students will become student members of a professional organization related to their field and hold a valid membership card.
- Eighty percent of MFGT students will attend at least one off campus tool show or event related to their profession.

REPORTING PROCESS:

- Status will be discussed by program faculty and department administration.
- One faculty member will organize and direct students to different professional organizations during the second semester of the freshman year.
- Students will demonstrate a greater comprehension and understanding of the manufacturing industry through written and oral reports completed by the students describing events and shows they attended.

RESOURCE REQUIREMENTS:

- Continued clerical and administrative support from the COT Dean's office.
- Continued clerical and administrative support from the MFGE Department office.
- FSU supported travel and faculty release time.
- $3,000 in new funds annually to offset transportation expenses for class trips to events related to the MFGT program (i.e. the Chicago International Machine Tool Show)

Program: Manufacturing Tooling Technology

Date: 12/01/95 (revised 11/03/96)

Prepared By: MFGT Program Faculty

GOAL 5.

To cultivate student's active learning, critical thinking, problem solving, and communication skills.

MAJOR ACTIVITIES AND PROCESSES:

- Students will be involved in a team effort that affects the manufacturing process before and after their area of expertise.
- Students will develop communications skills through the use of interactive multimedia and computer based presentations.

EXPECTED OUTCOMES:

- Students will better understand the complete manufacturing process broadening their knowledge base through team interaction and participation.
- Students will demonstrate an increased ability to communicate technical information effectively through the use of computer presentations.

INDICATORS/SOURCES:

- Students and employers will be surveyed every two years to determine if the communication skills and knowledge base was broadened through this experience.
- One hundred percent of the MFGT students will develop and present a computer based lecture communicating technical information to their faculty and peers.

REPORTING PROCESS:

- Discuss outcomes with the MFGT program Advisory Board, program faculty, and department personnel to maintain the highest level of technical exposure.

RESOURCE REQUIREMENTS:

- Continued clerical and administrative support from the MFGE Department office.
- $12,000 in new funds for the purchase of laptop multimedia ready computer systems for MFGT faculty and student presentations.
- $16,000 in new funds for the purchase of presentation display projectors to use in conjunction with the MFGT class room demonstrations and presentations.

Program: Manufacturing Tooling Technology

Date: 11/03/96

Prepared By: MFGT Program Faculty

GOAL 6.

To provide course specific software and hardware for the MFGT program.

MAJOR ACTIVITIES AND PROCESSES:

- Establish an annual faculty review of software & hardware needs by the MFGT program.
- Students will develop performance skills through the use of interactive multimedia and computer based presentations.
- Purchase a sufficient number of licenses of the current WordPerfect™ software version to meet the word processing/graphics requirements not attainable in Microsoft Word™.
- Update the machine controls on the Hurco CNC mills.
- Purchase a sufficient number of security devices for the Hurco software to provide workstations for the MFGT students.
- Purchase a network upgrade of the APS software.
- Upgrade the computer stations in the MFGT labs to more technically appropriate multi-media stations.

EXPECTED OUTCOMES:

- Students will better understand the complete manufacturing process broadening their knowledge base through individual participation.
- Students will demonstrate an increased ability to perform technical activities effectively through the use of computer related machine controls.
- The quality of student education will be enhanced.

INDICATORS/SOURCES:

- Students will have the resources to perform course assignments.
- Development of critical thinking skills to be demonstrated by student achievement of complex classroom / lab assignments.

REPORTING PROCESS:

- Discuss outcomes with the MFGT program Advisory Board, program faculty, and department personnel to maintain the highest level of technical exposure.

RESOURCE REQUIREMENTS:

- Continued clerical and administrative support from the MFGE Department office.
- Est. $500 - $5,000 for WordPerfect upgrade.
- $28,000 to upgrade Hurco CNC controls.
- Est. $3,000 for Hurco security devices.
- Est. $2,500 for APS software upgrade.
- Est. $36,000 for MFGT lab computer stations upgrade.

Program: Manufacturing Tooling Technology

Date: 11/03/96

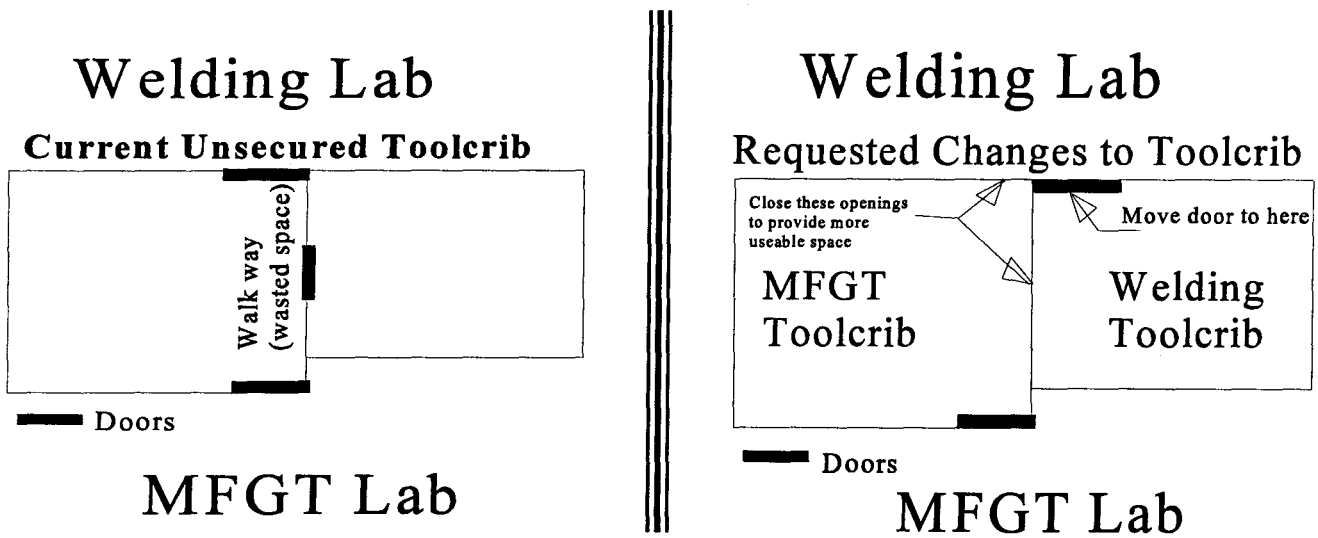
Prepared By: MFGT Program Faculty

GOAL 7.

To provide a secure and controlled area for supplies & equipment required for logistical support of MFGT faculty and students.

MAJOR ACTIVITIES AND PROCESSES:

- Establish an annual faculty review of supply and equipment needs by the MFGT program.
- Modify the current toolcrib area to separate the MFGT and WELDING supplies and equipment so that each program can secure their areas when classes are not in session.(see the drawing below)



EXPECTED OUTCOMES:

- Supplies and equipment can be secured.
- The cost of perishable tooling can be more efficiently controlled and/or monitored.
- Uncontrolled foot traffic between the two labs will be eliminated.

INDICATORS/SOURCES:

- Students will be able to find appropriate tooling to perform lab assignments.
- Securing the supplies and equipment should reduce the program operating cost through efficient use of available resources.

REPORTING PROCESS:

- Supplies status report to be generated by the MFGT lab technician and reviewed by the MFGT program faculty prior to each semester.

RESOURCE REQUIREMENTS:

- Continued clerical and administrative support from the MFGE Department office.
- Est. $1,500 to move one door and close two openings.

Program: Manufacturing Tooling Technology

Date: 11/03/96

Prepared By: MFGT Program Faculty

GOAL 8.

To provide a technically equipped classroom/staging area located adjacent to the MFGT lab facilities, which will provide the program a "quiet" area to demonstrate required course procedures.

MAJOR ACTIVITIES AND PROCESSES:

- Identify Swan 114 as a MFGT program specific classroom and remove it from the "general" classroom list.
- Equip the classroom with overhead monitors and a computer lecture station.
- Equip the classroom with appropriate workstations/benches to display models of the tooling, jig/fixture, die, and mold components necessary for simulation or subject matter instruction.

EXPECTED OUTCOMES:

- A greater understanding of course content can be achieved by the student.
- Improved safety for the faculty and students by having models, examples, and instruction on proper technique and procedure in a "quiet" area away from the noise of the operating machinery.

INDICATORS/SOURCES:

- Improved project quality and a better understanding by students of necessary skills to succeed.
- Less frustration for the student and fewer scrapped projects.

REPORTING PROCESS:

- Discuss outcomes with the MFGT program Advisory Board, program faculty, and department personnel to maintain the highest level of technical exposure.

RESOURCE REQUIREMENTS:

- Administrative support from the University, College, and MFGE Department offices to assign Swan 114 to the MFGT program.
- Est. $5,000 to initially equip the classroom with lecture computer and overhead monitors.
- Est. $1,500 for workstation/bench materials.

October 1, 1997

Manufacturing Tooling Technology

Unit Action Plan Status:

Goal 1.

Current Status: Positive Activity. Program faculty continue to visit high schools and career centers as well as working with industry to provide a steady flow of incoming students for the program. This has resulted in higher enrollment numbers for the last two years. Faculty work closely with students as advisors and participate with the students at university sponsored events. Faculty offer tutoring assistance and academic support to help students succeed with their course work. Faculty personally telephone and talk to prospective students and parents each year to offer assistance or guidance in making career choices. Faculty distribute the program recruiting video(produced by students, faculty, and industry) to high schools, parents, and prospective students.

Requirements: Allocate University funding or procure donation funding to copy and distribute the program recruiting video (est. cost $1,000 annually).

Goal 2.

Current Status: Positive Activity. To produce graduates with technical expertise needed to succeed in industry, the program faculty actively participate in and solicit input from advisory board members on current requirements for employees. Goals and future plans are reviewed and suggestions are made to continue moving the MFGT program forward.

Requirements: Continued clerical and administrative support from the COT Dean's office.

Goal 3.

Current Status: Positive Activity. Program faculty continue to maintain and expand their industrial contacts. These contacts have resulted in continued donations for the program and the university.

Among these include:

a) An annual donation from Kamp Oil and Citgo Corporation to meet our cutting fluid and lubricant needs.
b) A donation of 11 skids of injection molds.
c) A commitment from two industrial tool manufacturers to supply perishable tooling needs for the program.
d) A donation of a CNC lathe

Requirements: Continued clerical and administrative support from the department and dean's offices and FSU supported travel and faculty release time.

Goal 4.

Current Status: Positive Activity. MFGT program students have formed a student organization (The Ferris Machinists Association). This organization has worked with administration, industry, and students to help organize fund raising activities, promote FSU, and in general, make their educational experience more rewarding. Faculty and students have worked together to organize class trips to industrial sponsored events like the recent SME Detroit tool show. Students paid for transportation to participate in the one day event. This student organization continues to serve as ambassadors for the University by touring visitors through the facilities and visiting their high schools to speak with potential students.

Requirements: Allocate University funding or procure donation funding to offset transportation and entry fees for class trips to events related to the MFGT program (est. cost $3,000 annually).

Goal 5.

Current Status: Limited Activity. The MFGT faculty are using the computer presentation systems from media distribution whenever they are available. Unfortunately, they are not equipped with course specific software or hardware. Also, systems are not always available for classroom use when needed.

Requirements: Allocate University funding or procure donation funding to meet the student development and presentation goals of the program (est. cost $28,000).

Goal 6.

Current Status: **No positive action has been taken.**

Item 1: Upgrade WordPerfect. We were informed on 9/30/97 by Scott Thede, Computer Support Manager, that not only would the College of Technology not be upgrading WordPerfect, but the software was going to be removed from the network and would not be available for student use. The rationale given was that there were too many upgrades to monitor and that leaving WordPerfect on the network would cause students to seek assistance of the computer support services help desk. Currently, WordPerfect serves the MFGT program with superior capabilities in graphical manipulation as well as providing word processing support. We were told we would have to use Microsoft Word for our graphics and word processing needs. After students were unable to produce needed results using Microsoft Word, we spoke with Jeff Ek, the university graphics expert, who informed us that he does not use Microsoft Word for his graphics needs but uses Corel instead. We then contacted Microsoft technical support for assistance. Technical support

staff informed us that Microsoft Word was not capable of performing the same graphical manipulations as WordPerfect and that they had no plans to improve their product in that area.

Requirements: Leaving WordPerfect on the College of Technology network requires ZERO dollars and provides a valuable tool to students. Upgrading to the latest version was recently advertised for educational institutions at $1600 for a network license with "unlimited" seats.

Item 2: Upgrade Hurco CNC controls. We continue to solicit funding and support from all areas.

Requirements: Allocate University funding or procure donation funding to upgrade the controls (est. cost $28,000).

Item 3: Hurco security devices. To meet the demand of classes, we have borrowed, from Grand Rapids Community College, a number of security devices.

Requirements: Allocate University funding or procure donation funding to purchase needed devices (est. cost $3,000).

Item 4: APS software upgrade. We are currently rotating students through the existing stations.

Requirements: Allocate University funding or procure donation funding to purchase the needed upgrade (est. cost $2,500).

Item 5: MFGT computer lab upgrade. We have purchased hardware upgrades to existing computers (memory upgrades and added CD drives).

Requirements: Allocate University funding or procure donation funding to upgrade the computer stations to needed industry requirements (est. cost $36,000).

Goal 7.

Current Status: **Incomplete.** Construction was initiated during the summer(1997), without input from the MFGT faculty. The summer modification to the toolcrib controls the student traffic within the area where supplies are stored, however, the overall impact resulted in a loss of usable toolcrib space and the potential for students to enter both the welding and machine tool labs without supervision. The summer construction, certainly a step in the right direction, unfortunately does not meet the expected outcomes of the Unit Action Plan proposed by the MFGT faculty.

Requirements: 1. Allocate University funding or procure donation funding to move/modify door openings to the toolcrib (estimated at $1,500).
2. Continued clerical and administrative support from the DMGA department office.

Goal 8.

Current Status: **No action has been taken**.

Requirements: 1. Administrative decision from the University, College of Technology, and DMGA department offices to assign Swan 114 to the MFGT program.
2. Allocate University funding or procure donation funding to equip the classroom (estimated at $6,500).

Manufacturing Tooling Technology

APRC 1998-1999

Extra pages: 7

Ferris State University
College of Technology
Design, Manufacturing & Graphics Arts Department
Manufacturing Tooling Technology Program (MFGT)

COLLEGE OF TECHNOLOGY
Ferris State University
EXCELLENCE - HERITAGE - QUALITY - SERVICE - COMMITMENT

Memorandum

To: Doug Haneline, APRC Chair

cc: MFGT Faculty / PRP

From: Jack Gregory, MFGT PRP Chair

Subject: Program Review Panel Request for Additional Information

Date: October 25, 1998

Doug,

We have collected the additional information the panel requested at our meeting Thursday, October 22. The following documentation is attached:

1. Faculty Loads (Please note: this information is found in Appendix A pg. 13 -14)
2. Raw Data for Student Evaluations Summary (Section 4)
3. Raw Data for Faculty Evaluations Summary (Section 5)
4. Request Justification for Faculty Office Computers
5. Request Justification for Faculty Development

If you or the panel need additional information, please do not hesitate to contact me.

encl.

Attachment 4

MFGT 150 – Manufacturing Process
Credit Hours: 2 (1 Lecture – 3 Lab)

Faculty Loads (FTE)

	1998	1997	1996*	1995*	1994*
**D. Finney	1.00	1.00	1.00	1.00	1.11
**J. Gregory	1.00	1.00	1.00	1.11	1.11
G. Bolender***		0.50	1.00	1.00	1.13
T. Groner***					1.00
D. Chase		0.17			
R. Goodwin		0.92			
B. Hammond	0.17	0.17	0.25		
P. Driggers	1.09	1.00			
**L. Nemastil	1.00				
J. Littley	0.67				
P. Smania	0.17	0.50	0.58	0.08	0.33
T. Crandell		0.04			
*Other Faculty			1.42	1.18	
Total FTE	5.10	5.30	5.25	4.37	4.68

*Data supplied by administration (Ken Kuk, 3 Jun 98) as incomplete.

**MFGT Tenured/Tenure Track Faculty

*** Retired or Former Faculty

Manufacturing Tooling Technology
Scheduling Requirements
Prepared By: Kenneth A. Kuk
16-Oct-97

Course Number	Course Name	Lecture Hours	Laboratory Hours	Contact Hours	Credit Hours	Sections Required	Section Capacity	Section Productivity
Major Fall								
Mfgt 111	Removal 1	4	0	4	4	1	40	160
Mfgt 111	Removal 1	0	12	12	4	1	20	80
Mfgt 111	Removal 1	0	12	12	4	1	20	80
Mfgt 112	Handbook	3	0	3	3	1	40	120
Mfgt 211	Die Construction	4	0	4	4	1	40	160
Mfgt 211	Die Construction	0	12	12	4	1	20	80
Mfgt 211	Die Construction	0	12	12	4	1	20	80
Mfgt 212	CAD/CAM/CNC	3	3	6	4	1	20	80
Mfgt 212	CAD/CAM/CNC	3	3	6	4	1	20	80
Major Winter								
Mfgt 121	Removal 2	4	0	4	4	1	40	160
Mfgt 121	Removal 2	0	12	12	4	1	20	80
Mfgt 121	Removal 2	0	12	12	4	1	20	80
Mfgt 122	Manual CNC	3	3	6	4	1	20	80
Mfgt 122	Manual CNC	3	3	6	4	1	20	80
Mfgt 221	Mold Construction	4	0	4	4	1	40	160
Mfgt 221	Mold Construction	0	12	12	4	1	20	80
Mfgt 221	Mold Construction	0	12	12	4	1	20	80
Technical Related								
Mfgt 150	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150*	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150*	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150*	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150**	Mfg Processes	1	0	1	1	1	30	30
Mfgt 150**	Mfg Processes	0	3	3	1	1	15	15
Mfgt 150**	Mfg Processes	0	3	3	1	1	15	15
Mfgt 252	Adv. Machine Tools	3	3	6	4	1	20	80
Mfgt 252	Adv. Machine Tools	3	3	6	4	1	20	80
TOTALS	TOTALS	43	150	193	93	37	840	2240
FTEF/YEAR REQUIRED				5.36	3.88			
THEORETICAL PRODUCTIVITY SCH/FTEF				418				

*** Required for AAS Rubber Technology Winter 1999**
****Required for AAS Rubber Technology Winter 2000**

Manufacturing Tooling Technology - Student Evaluation of Program Results - 1998 (Raw Data)

ID	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10	Q 11	Q 12	Q 13	Q 14	Q 15		
1	2	3	3	3	3	4	2	2	3	4	2	3	2	2	2		
2	2	3	2	4	3	2	2	4	3	3	2	4	2	2	3		
3	4	2	2	3	3	2	2	3	1	3	3	3	3	2	1		
4	4	4	2	3	2	2	3	2	2	1	2	1	2	2	1		
5	4	3	5	5	3	4	4	3	3	3	4	1	4	2	2		
6	4	3	4	4	5	1	4	4	4	3	3	4	4	4	4		
7	5	4	4	4	5	3	5	4	4	4	4	4	5	5	4		
8	3	3	4	3	4	2	2	2	2	4	3	3	2	3	3		
9	4	3	4	4	4	4	4	4	2	3	4	3	3	3	3		
10	3	3	4	4	5	2	4	2	2	2	3	3	3	3	3		
11	4	4	4	4	4	1	4	1	4	2	5	3	5	5	5		
12	4	3	5	4	5	2	4	2	2	2	3	2	4	4	4		
13	3	2	3	4	5	1	2	4	3	3	4	4	3	4	4		
14	3	3	3	3	3	4	4	4	4	4	3	4	3	3	4		
15	4	4	4	3	4	3	4	4	4	3	4	4	4	3	4		
16	4	4	4	4	5	4	5	4	4	4	4	4	4	5	5		
17	4	4	4	4	4	2	4	3	2	3	4	3	4	4	4		
18	4	4	5	5	4	2	5	5	3	3	5	4	5	4	4		
19	4	4	3	3	4	3	4	4	4	4	4	4	4	4	4		
20	4	5	4	4	4	4	5	4	3	3	5	4	4	4	5		
21	5	4	4	2	4	4	4	3	3	4	5	5	5	4	4		
22	3	2	3	4	5	1	2	4	3	3	4	4	3	3	3		
23	4	4	4	4	4	1	4	1	4	2	5	3	5	4	4		
24	5	4	4	4	5	3	5	4	4	4	4	4	5	4	3		
AVG	4	3	4	4	4	3	4	3	3	3	4	3	4	3	3		
Median	4	3.5	4	4	4	2	4	4	3	3	4	4	4	4	4		
Mode	4	4	4	4	4	2	4	4	4	3	4	4	4	4	4		

MFGT Faculty Perception Survey Results, 1998							(Raw Data)												
ID	Program	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18
1	TDTD	1	1	1	4	4	5	5	0	0	1	2	2	0	0	3	2	2	2
2		0	2	2	3	4	2	2	1	1	1	1	1	2	2	3	1	1	2
3		2	0	1	4	2	4	3	2	2	2	2	2	0	0	0	3	2	3
4		1	1	1	2	3	2	2	2	2	1	1	1	1	2	3	3	1	1
5	WELD	1	1	4	2	2	2	1	3	4	1	1	1	3	4	2	3	2	2
6		1	1	1	1	3	2	1	1	1	1	1	1	1	1	2	3	1	1
7		0	0	2	2	3	0	2	0	2	0	0	0	0	0	0	0	0	1
8	MFGT	1	1	1	3	4	3	3	1	1	1	2	1	1	1	5	1	1	3
9		1	1	1	4	4	2	3	2	3	1	1	1	2	2	3	2	1	1
10		2	2	1	0	0	2	4	2	2	1	1	1	2	2	0	2	2	3
11		3	3	1	4	4	3	4	2	2	1	2	1	2	0	4	2	1	4
12	MECH	2	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0
13		1	1	1	1	3	3	2	1	1	1	0	0	0	1	4	3	1	1
14	MFGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15		1	1	1	3	2	3	2	2	2	1	1	2	2	2	2	2	1	2
16		1	2	1	2	3	4	4	2	2	1	1	0	2	2	4	2	2	3
17		1	1	1	2	4	3	2	2	2	1	1	2	2	2	3	3	2	2
18		1	2	1	2	3	4	4	2	2	1	1	0	2	2	4	2	2	4
19		1	1	1	2	4	3	2	2	2	1	1	2	2	2	3	3	2	2
20		1	1	1	0	4	4	4	0	0	1	1	1	1	2	4	3	1	5
21		1	1	1	3	3	2	3	1	0	1	4	1	1	3	0	0	1	3
22	PLTS	2	2	2	2	5	0	0	2	0	2	0	0	0	2	0	0	2	2
23		2	2	0	0	0	0	0	0	0	0	0	0	2	2	0	0	3	0
24		1	1	1	3	5	4	4	2	0	1	1	2	0	3	0	1	2	1
25		2	2	2	3	0	3	0	0	0	0	0	0	2	0	0	0	2	3
26	PDET	0	0	2	2	4	0	2	3	2	2	3	1	2	3	2	4	2	3
27		1	1	1	1	2	2	2	2	2	1	1	1	1	1	2	2	1	3
AVG		1	1	1	2	3	2	2	1	1	1	1	1	1	2	2	2	1	2
Median		1	1	1	2	3	2	2	2	2	1	1	1	1	2	2	2	2	2
Mode		1	1	1	2	4	2	2	2	2	1	1	1	2	2	0	2	2	3

MFGT Program Review

Subject: Request Justification

"A one time upgrade for MFGT faculty office computers of $15,000"

The computers currently being used in faculty offices include:

2- 486-66MHz (Approximately 6 years old)
2- Pentium 90MHz (Approximately 4 years old)

With the continuing advancement in technology, a computer, which is 3 years old, fails to meet the minimum requirements necessary to run programs being developed today. The 486 computers, currently used in MFGT faculty offices, are running Windows 3.1, and even though this has proven to be a more stable operating system than Windows 95 on a network environment, faculty are not able to keep up with student assignments or relate to the needs of student problems.

Program specific software, required for course-work activities, have minimum hardware requirements. Currently, MFGT program software minimums require a system with the following configuration: Pentium II - 266 MHZ, MMX capability, AGP level 2 video graphics with 8 meg of ram, 10+gig hard drive, 128 meg ram, 100 MHZ bus speed, CD rom, with other features recommended for system performance. As you can see, our current systems are not even close to meeting the minimum requirements. Faculty are currently using their personal equipment to meet the hardware needs for the program. This has caused several problems with software licensing and support issues.

Faculty are unable to use the campus e-mail system because the current hardware being used will not support the Lotus Notes Client software. Although we can receive some e-mail using the Internet access, without client, we cannot delete most of the mail we get and therefore our "inbox" keeps getting larger and slower.

MFGT faculty office computers are used to: develop course activities, tutor and advise students on assignments and course-work, communicate with other faculty, staff, and administration, prepare classroom materials, and to keep up with technology software updates, among other program and university related activities.

Unlike administrative offices, which rely on fundamental word-processing, spreadsheet, and database activities, we believe there should be a plan to upgrade faculty offices, in technology intensive programs, every 2 - 3 years. We also understand the economic difficulty this implies, therefore, we have requested this one time upgrade for MFGT faculty office computers of $15,000. It is our belief, that with educational discounts, we would be able to purchase the most current hardware system with the features needed for appropriate system performance. This would provide the MFGT faculty with the hardware needed to accomplish the tasks previously listed, while providing a window of opportunity for administration to address the issue of a plan for upgrading office computers.

MFGT Program Review

Subject: Request Justification

"Establishment of an annual faculty development fund of $1,500 per faculty"

As everyone is acutely aware, advancements in technology are occurring almost daily. As these developments occur, that technology is being utilized within our society and specifically the Manufacturing discipline. Equipment is built or modified, using the new technology, to enhance performance or provide additional capability. For the MFGT program to continue as a leader in producing graduates sought by industry, nation-wide, it is necessary that the program faculty keep up with these technological advancements. We believe it is faculty industrial experience, which makes our program so successful. We also believe if we are to continue with this success, it is our responsibility to keep our knowledge current. To attend seminars, serve on advisory committees, visit and work with industry, investigate advancements in technology, and to experiment with these advancements to measure the impact and the relationship it has or should have on MFGT course content.

These activities require extensive time, energy, dedication, and financial resources to accomplish. The faculty are dedicated to this pursuit and the request for an annual fund of $1,500 per faculty is to help provide financial support for these activities. Although development is usually more expensive than $1,500 per year, this would be a start to help defer the cost and show that the university is dedicated to assist in these development ventures.