Technical Drafting & Tool Design

APRC 1997-1998

section 1 of 3

Ferris State University

President, William Sederburg

College of Technology

Dean, Mark Curtis

Design, Manufacturing, and Graphic Arts

Department Head, Doug Chase

Academic Program Review

of

Technical Drafting and Tool Design

1996-97

Program Review Panel:

Co-Chairs:

Mark Hill, Professor, DMGA Department

Rick Eldridge, Associate Professor, DMGA Department

Program Faculty:

Todd Rose, Assistant Professor, DMGA Department

Gary Bradt, Associate Professor, DMGA Department

FSU Faculty Member:

Cheryl Irvine, Assistant Professor, Humanities Department

Special Interest in Program:

Steve Cole, Advisory Committee Member, TDTD

Design Division Coordinator:

Dr. George Olsson, Professor, DMGA, Department

Submitted:

September 15, 1997

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Section 1 Overview of Program
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Section-1. Overview of Program

The foundation for skilled designers and one of the major support programs is the Technical Drafting and Tool Design program. The Technical Drafting and Tool Design program had as its genesis the Mechanical Drafting program established in 1947 with seven students, today with 1,140 graduates, it is one of the primary providers of students into the Manufacturing Engineering, Product Design, and Plastics bachelors degrees with the 2+2 laddering concept at Ferris. The Technical Drafting and Tool Design program is a critical component to the overall success of graduates from the Manufacturing Department. Graduates are able to seek gainful, career positions after completion of two years in the Technical Drafting Tool Design program if they elect not to earn a bachelor's degree.

The restructuring efforts during the 1996 academic year placed the Technical Drafting and Tool Design program in the department of Manufacturing, Design and Graphic Arts which is one of three departments in the College of Technology.

The Technical Drafting and Tool Design program is an applied technology and is a provider of draftsman for product, Tool, Die, and Injection Mold Designers to the State of Michigan as well as the mid-west region of the United States.

With a major initiative for CAD/CAM (Computer Aided Drafting and Computer Aided Machining) applications in the fall 1983, the Technical Drafting and Tool Design program started a major change in curricula. Many major changes in applied CAD/CAM and related technologies have been incorporated into the curriculum during past fourteen

years. Advisory committee and faculty plans have been identified and implemented to make the Technical Drafting and Tool Design program remain current with industry requirements. With the changes of products being prototyped with new technologies, the Technical Drafting and Tool Design program has recently incorporated Rapid Prototyping technologies into the curriculum via service bureaus.

Support for the various CAD/CAM labs that the Technical Drafting and Tool Design program uses have come from two major sources. The initial CAD/CAM lab that the Technical Drafting and Tool Design program used was the former college wide "CAD/CAM lab" which was an open lab for all college of technology students. More recently the Technical Drafting and Tool Design program has used its Vocational Educational (voc ed) funds to establish a dedicated CAD lab for its students. The planning and implementation of future computer labs will be important to the program.

The Technical Drafting and Tool Design program has worked with a consistently reduced budget the past several years. With the costs of supplies and equipment on a constant rise we do not receive sufficient moneys from the College of Technology department budget to run the program in a normal educational manner. Donations from industry and faculty as well as passing along some costs to the student have allowed the Technical Drafting and Tool Design program to remain status quo. With annual discussions of the future availability and or amounts of vocational educational funds, computer and supply and equipment budgets will need attention.

Plans for improvement of the program include, more industrial Rapid Prototyping activities, implementing a tear-down lab, creating an additional dedicated 24 seat computer lab.

Enrollment in the Technical Drafting and Tool Design program, at present, is stable. The faculty believe that there are many factors contributing to the decline from earlier 'full enrollment' numbers. Among the contributing factors are: Ferris' negative image featured in news releases on various topics, room, board and tuition increases, semester conversion, lack of computer support, appearance of classrooms, and private school competition. The faculty has implemented a basic strategy for recruitment at schools that have consistently sent high school graduates to the Technical Drafting and Tool Design program.

Placement in the Technical Drafting and Tool Design program is consistent with other 'feeder programs' at Ferris. High demand for the Technical Drafting and Tool Design graduate is realized due to the high numbers that go on for a BS degree leaving few graduates that are available for the job market. The high demand is also demonstrated by companies wanting to have many of our freshmen work in their companies during the summer.

The Technical Drafting and Tool Design program has long been recognized as a regional leader in providing highly qualified Technical Draftsmen and entry level Tool Designers. Many companies have visited Ferris in the hopes of recruiting a Technical Drafting and Tool Design graduate. Visitors from Seattle, St. Louis MO, as well as all the surrounding states have made Ferris a recruiting stop. Those that are lucky enough to hire a Technical Drafting and Tool Design graduate, often call or write indicating that the student was well prepared, and 'do you have any more like the one that I hired'. Many

graduates respond back in a similar tone, comments can be found in Section 2 of this report.

Program Profile

Programs: **Technical Drafting/Tool Design**
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.

The Technical Drafting/Tool Design Technology degree is designed to prepare students to enter industry as Technical Draftsmen/Detailers entry level Tool Designers and CAD Operators.

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 incorporating current technology.

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

In addition to serving its majors, the Technical Drafting/Tool Design program provides courses for the Manufacturing Tooling Technology majors. Faculty teach Engineering Graphic courses to most programs and in the Manufacturing Department. The TD/TD program ladders into the B.S. Manufacturing Engineering Technology, Product Design Engineering Technology and Plastics Engineering Technology.

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

The Technical Drafting/Tool Design program is a full participant in the Vocational Technical Articulation with Michigan's High School system.

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

The Technical Drafting/Tool Design Program constantly recruits and places graduates in the local community, the state and the region. A faculty member from the program has represented a paper outside the United States. Faculty provide training and CAD exposure for local high school students. The program has gained state and national recognition.

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.*

a. *Tenure-track*

See attached Personnel Profiles.

b. Adjunct

N/A

c. Temporary, full-time and part-time

N/A

2. FTE overload

FTE overloads are nominal.

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

Off-campus programs do not apply to the Technical Drafting/Tool Design program.

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

Administration

a. Mark Curtis, Interim Dean, College of Technology
   EdD. Educational Leadership, Western Michigan University
   M.S. Education, Western Michigan University
   B.S. Education, Western Michigan University
b. 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
c. George Olsson, Professor/Faculty Coordinator

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

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

6. Student assistants

Students (tutors) assistants and laboratory aids (maintenance) are hired as required to support laboratory activities and maintenance.

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

Advisory board membership

See Attached List.

B. Instructional Resources

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

The Technical Drafting/Tool Design Program has 3 labs Swan 502, 503, and 504. Swan 502 and 504 are maximal Drafting labs, while Swan 503 is a 23 seat CAD/CAM lab.

2. *Supplies and expense budget*

Supplies and expense budget for past five academic years.

91/92	92/93	93/94	94/95	95/96
$5,741	$4,839	$6,939	$5,781	$4,900

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

3. *Equipment acquisition budget*

Equipment acquisition budget for past five academic years.

No formal budget

*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.

We have received approximately $3,000 during the past four years from one company.

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

Travel Budget for 1995/96 was $0. Funds were provided from Technical Drafting/Tool Design Local account.

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

Professional Development for 1995/96 was $400 per faculty member.

7. *Library resources*

Library Resources are appropriate with full access for faculty and students. The Library provides technical support staff.

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

Faculty Activities

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

Each faculty member serves or has served on department, college, and/or university committees.

2. *Professional organizations*

Faculty, at various times, have been members of the Society of Manufacturing Engineering.

3. *Publications*

One Faculty member has presented papers on Rapid Prototyping at the local, state national and international levels..

4. *Consulting*

All faculty members are actively involved in consulting on a continual basis. These experiences help to keep their expertise relevant for the students. Computer, CAD, Blueprint, and GDT are typical areas of expertise. Refer to faculty profiles for additional areas.

III. *Enrollment, Recruitment and Retention*

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

1. Student credit hours/FTE.

	91/92	92/93	93/94	94/95	95/96
SCH/FTEF	Unknown	(Refer to Section 10)			

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

	91/92	92/93	93/94	94/95	95/96
A.A.S.		(Refer to Section 10)			

Note: No off-campus programs

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

	91/92	92/93	93/94	94/95	95/96
A.A.S.		(Refer to Section 10)			

Note: No off-campus programs

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

	91/92	92/93	93/94	94/95	95/96
% Placed		(Refer to Section 10)			

* Estimated

5. Graduates promotability and advancement.

Graduates enjoy outstanding career mobility. Alumni are located in over 10 states. Graduates are making more than $50,000 per year. Many of the Alumni either hold or are pursuing a graduate degree. (See Section 2).

6. Program capacity.

With current resources, the program can accept 46 freshmen (2 sections of 23). Targeted total enrollment is 86.

7. Accepts/enrollees ratio.

B. *Recruitment*

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

Various Faculty:

a. Visit 10 high schools per year.
b. Participate in Autumn Adventure.
c. Participate in homecoming activities.
d. Write and Administer the NOCTI drafting test.

e Have judged the Annual State VICA Drafting contest.
f. Provide tours and demonstrations to visiting high school and career centers.

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

During the 1996/97 school year we had 200 prospects. The program enrolled 44 freshmen for Fall 1997.

C. *Retention.*

1. *Are there any identifiable retention problems associated with the program?*

Not in terms of FTIAC's

2. *What efforts are being exerted to resolve retention issues? Assess program achieved in this area.*

The program(s) enjoy one of the highest retention rates on campus (FTIAC) because of the academic program course content , and the faculty commitment to the students and providing solid academic counseling.

3. *Describe activities of program-related student organizations.*

Some SME Membership as well as technical speakers from industry, plant tours, and technical symposium are available to Technical Drafting/Tool Design Students. The Technical Drafting/Tool Design group also skis, golfs and plays softball each 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. Various faculty members have actively advised the SME Student Chapter.

IV. *Effectiveness of the program.*

A. *Curriculum.*

1. *What are the graduation requirements?*

See attached check sheets.

2. *Include a suggested semester-by-semester sequence of courses to be completed.*

See attached check sheets.

3. *Comment on the currency of the curriculum with respect to the present and future expectations form the graduate at the workplace.*

Please review Alumni, Employer, Advisory Board Survey.
Sections of this report.

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.)?*

   Quality and Quantity of job placement.

2. *What approaches are utilized to enhance the quality of instruction?*

   Constant pursuit by the faculty of additional degrees and attendance at workshops, seminars, and expositions.

3. *How is student performance assessed?*

   Examinations, quizzes, term papers, laboratory projects, reports, oral presentations, discussion with employers.

4. *How is the quality of instruction measured?*

   Student Evaluations, Peer Evaluations, and Alumni Evaluations, Industrial Evaluations.

5. *How are the course contents kept current?*

   Annual Advisory Board program review, industry input, annual alumni surveys, and employer feed back. Faculty visits to Industry and Technical shows.

6. *How is the success of graduates gauged?*

   Initial employment in their field and Alumni surveys. Direct contact with employers

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

Advantages

1. High faculty/student contact.
2. Use of current technology.
3. Expert faculty members.
4. Articulation agreements.
5. Superior feeder to B.S. laddering programs.
6. Diverse education

Disadvantages

An inadequate capital equipment budget and faculty development budget. The program is at risk because of its extreme dependence on high-end computers and software without a solid University or College developed plan for replacement.

V. *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.

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

To date, administrative cost reduction and initial recognition of program financial constraints. Stability of curriculum and programs future. Ability to recruit students into the program.

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)?*

The TD/TD program would like to excel in the 3D solids and parametric technology area. Industrial quality Rapid Prototyping technology needs to be seriously evaluated for the TD/TD program.

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
4. Lack of Fiscal and Technical support will effect curriculum and future enrollment.

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

With a lack of funding for capital equipment, supply expenses and faculty development, the faculty have to go to the private sector for donations of money or services. The program has been successful in obtaining minimal gifts. The curriculum has been affected from time to time. Revised budgets for equipment, supplies and faculty development; should be established. A strategy to obtain formalized gifts and equipment consignments need to be developed and nurtured internally and externally by the University (formal long-term partnerships).

The potential for the TD/TD program to receive national recognition is possible. An industrial quality Rapid Prototyping machine in the TD/TD program would provide a current application for our students. The quality and complexity of student demonstrated work could be marketed in many publications. Training and instructional workshops would be developed for educators and potential students around the state. A budget reorganization to reflect the S&E as well as the capital equipment should be reflected as follows;

$15,000 per year S&E and Maintenance.
$20,000 per year capital equipment.

FERRIS STATE UNIVERSITY

COLLEGE OF TECHNOLOGY

DESIGN, MANUFACTURING & GRAPHIC ARTS DEPT.

PERSONNEL PROFILES

Technical Drafting / Tool Design

Gary L. Bradt
616/592-2517

Assistant Professor, Technical Drafting/Tool Design
MS, Technical Education, Ferris State University
27 hours graduate credit, Central Michigan University
BS, Industrial Education, Central Michigan University
Apprenticeship in Tool Design, Cross Fraser
Areas of expertise: product design, mold design, cutting tool design, machine design, fixture design, CAD, CAE, finite element analysis, moldflow, GD & T, dimensioning, tolerancing

Rick Eldridge
616/592-2957

Assistant Professor, Technical Drafting/Tool Design
MS Occupational Education, Ferris State University
BS, University of Northern Colorado
AAS Drafting, Kellogg Community College
Senior member SME
Master examiner, MOCAC
10 years experience automotive seat and seat recliner design
Areas of expertise: drafting, CAD, GD&T, descriptive geometry, jigs, fixtures and gaging

Mark Hill
616/592-2514

Professor, Manufacturing Engineering Technologies Department
MS Occupational Education, Ferris State University
BS Trade Technical Teacher Education, Ferris State University
Vocational Drafting Certification, State of Michigan
Master Examiner MOCAC
Areas of expertise: 3D-CAD, surfacing, CAD systems, administration, stereolithography, drafting, tool design

Todd N. Rose
616/592-2958

Assistant Professor, Technical Drafting/Tool Design
MS Industrial Management, Western Michigan University
BS Trade-Tech. Ed., Ferris State University
AAS Tech. Drafting/Tool Design, Ferris State University
Society of Manufacturing Engineers
20 years engineering experience
Areas of expertise: technical drafting, descriptive geometry, CAD, tool design, GD&T, manufacturing engineering, product design, metal stamping & die design

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Doug Chase — Assistant Dean / Department Head

George Olsson — Professor, Faculty Coordinator

Linda Faysal — Department Secretary

Sherry Maus — Department Secretary

Direct Inquiries To:

Technical Drafting / Tool Design Faculty
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Technical Drafting/Tool Design Advisory Board
June 26, 1997

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1300 N. Dort Highway
Flint, MI 48556
810/257-8936

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

TECHNICAL DRAFTING AND TOOL DESIGN
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER
Curriculum Guide Sheet

NAME OF STUDENT_____ STUDENT I.D. _____

Total semester hours required for graduation: 67

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				
TDTD	111	Drafting Fundamentals	6	
TDTD	112	Fundamentals of CAD	3	
ENGL	150	English 1	3	
MATH	116	Intermediate Algebra and Numerical Trigonometry*	4	
FIRST YEAR - WINTER SEMESTER				
TDTD	121	Product Detailing	6	
TDTD	122	Computer Aided Product Detailing	3	
COMM	121	Fundamentals of Public Speaking	3	
ENGL	250	English 2	3	
MFGT	150	Manufacturing Processes 1	2	
SECOND YEAR - FALL SEMESTER				
TDTD	211	Die Design	6	
TDTD	212	Computer Aided Tool Design	3	
MATL	240	Introduction to Material Science	4	
PHYS	211	Introductory Physics 1	4	
SECOND YEAR - WINTER SEMESTER				
TDTD	221	Mold Design	6	
TDTD	222	Computer Aided Engineering	3	
MFGT	252	Advanced Machine Tools	2	
____	____	Cultural Enrichment Elective	3	
____	____	Social Awareness Elective	3	

NOTE: Students planning on entering a four-year technology degree program must take MATH 116 and MATH 126 sequence to meet entrance requirements where MATH 216 is called for.

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CURRICULUM REQUIREMENTS
TECHNICAL DRAFTING AND TOOL DESIGN
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER

TECHNICAL	CREDIT HOURS
TDTD 111 Drafting Fundamentals	6
TDTD 112 Fundamentals of CAD	3
TDTD 121 Product Detailing	6
TDTD 122 Computer Aided Product Detailing	3
TDTD 211 Die Design	6
TDTD 212 Computer Aided Tool Design	3
TDTD 221 Mold Design	6
TDTD 222 Computer Aided Engineering	3
Technical Related	
MATL 240 Introduction to Material Science	4
MFGT 150 Manufacturing Processes 1	2
MFGT 252 Advanced Machine Tools	2

GENERAL EDUCATION	CREDIT HOURS
Communication Competence	
ENGL 150 English 1	3
ENGL 250 English 2	3
COMM 121 Fundamentals of Public Speaking	3
Scientific Understanding	
PHYS 211 Introductory Physics 1	4
Quantitative Skills	
MATH 116 Inter. 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

(OVER)

FERRIS STATE UNIVERSITY

Associate in Applied Science in

Technical Drafting and Tool Design

Technical Sequence

TDTD 111 Fundamentals of Drafting
Basic techniques of lettering, linework, geometric construction, orthographic projection, auxiliary views, sectioning, basic dimensioning, pictorial drawings, and basic elements of descriptive geometry are explored through discussion and laboratory assignments. 6 credits.

TDTD 112 Fundamentals of CAD
Introduces operation of a CAD system and reinforces the TDTD 111 lab projects. Computer graphics system for creating of two and three dimensional geometry. File creating and management with graphics generation through a keyboard or on screen command structure. Geometric construction, orthographic and auxiliary projections, sectioning, dimensioning, editing, and geometry manipulation. Corequisite: TDTD 111. 3 credits.

TDTD 121 Product Detailing
Continues development of basic technical skills in solution of layout problems and general technical drafting. Advanced elements of descriptive geometry and principles of revolution are presented along with flat pattern development. Product drafting procedures are used in teaching projection practices, dimensioning techniques, surface finish control, geometric and positional tolerances, sections, symbols, and conventions. Laboratory assignments cover layouts, detailing, sub-assembly, and assembly drawings. A.N.S.I. standards are stressed. 6 credits.

TDTD 122 Computer Aided Product Detailing
Expands knowledge in the operation of a computer graphics system and reinforces the TDTD 121 lab projects. Hands-on experiences at the graphics design station are gained while working on two-dimensional and three-dimensional drafting and design exercises. System orientation, graphics generation, graphics editing and manipulation, detailing, dimensioning, GD&T, and surfacing are included. 3 credits.

MFGT 150 Manufacturing Processes
A basic machine process course. The fundamental operations on machine tool equipment including engine lathe, band saw, and horizontal and vertical milling machine. Measuring and inspection tools, drill press, and surface plate. 2 credits.

TDTD 211 Die Design
Provides the knowledge and ability to design various types of stamping dies. Operations such as blanking, forming, cam, piercing, drawing, and trimming in the design of single operation and progressive dies utilizing standard and special components. Press accessories and feeding mechanisms they relate to the design problems, and safety standards are applied. Drawing boards, and CAD systems utilized for the assignments. Prerequisites: TDTD 121. 6 credits.

TDTD 212 Computer Aided Tool Design
Develop skills in two and three dimensional CAD tool design applications. Design various tooling concepts including jig and fixture and special machine components. Detailing, bill of material, and other related projects. Prerequisites: TDTD 122. Corequisite: TDTD 211 or 221. 3 credits.

MATL 240 Introduction to Material Science
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. 4 credits.

TDTD 221 Mold Design
Design and detail single and multiple cavity plastic injection molds and products using drawing boards and computer aided design systems. Analysis of mold cavity fill, gate location(s)/size, runner size, and balance evaluated with computer aided mold fill program. Theory, application and practices of: plastic materials, forming and molding methods/machines, mold: bases, venting, cooling, ejectors, materials, heat treatments, fabrication, and finishing practices. Prerequisites: TDTD 121. 6 credits.

TDTD 222 Computer Aided Engineering
Using computer aided moldflow analysis programs, review material databases, determine the optimum process feasibility, balance runner systems, create and mesh finite element models, perform three-dimensional computer analysis and read and interpret the data displayed. Static analysis of mechanical products and systems performed by creating models to be investigated with finite element analysis software. Application of finite element modeling and analysis to tooling and plastic products. Prerequisites: TDTD 121, 122. 3 credits.

MFGT 252 Advanced Machine Tools
Exercises in part processing, job routing, mill duplicating, pantograph, external grinder, electrical discharge, and numerical control machining. Introduction to jib, fixtures, sheet metal dies, and plastic mold tooling with respect to construction and operation. Punch press, mold wax tryout, numerical control machines, and internal as well as tool post and centerless grinding. Prerequisites: MFGT 150. 2 credits.

Section 2 Graduate follow-up Survey
Contents

FERRIS STATE UNIVERSITY

March 7, 1997

Technical Drafting / Tool Design Program Alumni Survey

The Technical Drafting/Tool Design program at Ferris is accredited by the North Central Association . The recent NCA site visit team mandated that Ferris develop a program review process for all academic programs at the University.

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 goal of program review is to insure that the academic programs of the University achieve and maintain the highest possible standards of academic excellence. 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 1996/97 academic year, the Technical Drafting/Tool Design 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 survey sheet with your written responses in the addressed stamped envelope by April 18, 1997. The survey should only take a few moments to complete. Individual responses are confidential but the overall responses will be analyzed to help determine the status, trend, and future of the TDTD program at Ferris.

Your participation in this survey is critical in order for us to get an accurate review of our program. On behalf of the current and future students, the faculty of the TDTD program thank you in advance for your time and input.

Sincerely,

Mark Hill, Professor
TDTD

Rick Eldridge, Assistant Professor
TDTD

Gary Bradt, Assistant Professor
TDTD

Todd Rose, Assistant Professor
TDTD

\\cot01\sys\users\faysall\tdtd\pgrevltr.doc

DESIGN, MANUFACTURING, AND GRAPHIC ARTS
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TECHNICAL DRAFTING / TOOL DESIGN

ALUMNI SURVEY

About Yourself:

What is your name and what is your employment address?

_____
_____
_____
_____

What year did you graduate from the TDTD program?_____

Did you receive a BS degree from Ferris? _____yes _____no

If yes what program?_____

Plastics	Manufacturing Engineering	Product Design
Business	Education	Other_____

Did you receive a BS degree from another university _____yes _____no

If yes, name of degree and university_____

What is your present job title? _____

What was your starting salary after graduation? *(please circle one)*

Ranges: $ 10 - 15,000
15 - 18,000
18 - 22,000
22 - 26,000
26 - 30,000
30 - +

What is your present salary range?

Range: $ 15 - 18,000
18 - 22,000
22 - 26,000
26 - 32,000
32 - 40,000
40 - 50,000
50 - +

Was it difficult to find a position in a Drafting/Tool Design or closely related field upon graduation?

___YES ____NO

About your Technical Drafting and Tool Design Education:

Based on your experiences and knowledge of the profession, To what extent did the course knowledge in the following areas prepare you for employment?

:

Please circle the appropriate rating

	To a Great Extent	Somewhat	Neutral	Very Little	Not at All
Fundamentals of Drafting (board)	A	B	C	D	E
Introduction to CAD	A	B	C	D	E
Descriptive Geometry (board)	A	B	C	D	E
Product Detailing	A	B	C	D	E
CAD 3D Wireframe and Surfacing	A	B	C	D	E
CAD 3D Solids	A	B	C	D	E
Tool Design	A	B	C	D	E
Die Design	A	B	C	D	E
Mold Design	A	B	C	D	E
Basic Machine Tool Operations	A	B	C	D	E
Advanced Machine Tools w/CAM	A	B	C	D	E
Physics (general)	A	B	C	D	E
Material Science	A	B	C	D	E
Product Detailing with GDT	A	B	C	D	E
Product Assemblies	A	B	C	D	E
Moldflow/CAE	A	B	C	D	E

In thinking over your experiences at Ferris, to what extend to you feel your Associate Degree prepared you for success?

Please circle the appropriate rating

	To a Great Extent	Somewhat	Neutral	Very Little	Not at All
Overall Technical Training	A	B	C	D	E
Gaining a Broad General Education	A	B	C	D	E
Writing Clearly and Effectively	A	B	C	D	E
Acquiring proficiency with computers	A	B	C	D	E
The ability to learn on your own, pursue ideas, and find information you need.	A	B	C	D	E
How effectively did Ferris prepare you for employment?	A	B	C	D	E
In general, how satisfied were you with your overall experience in the TDTD program?	A	B	C	D	E
Would you recommend the Technical Drafting and Tool Design program to a friend or relative?	A	B	C	D	E

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

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

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

Please list any other course(s) that you think should be included in the program.

What did you think of the TDTD facilities?

What trends in the Drafting and Tool Design industry do you see impacting the TDTD program at Ferris in the next 5 years?

Please add any general comments.

Please return by April 18, 1997

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Alumni Survey of Graduates

Summary

This section of the Program Review Report summarizes and/or displays the results of the Technical Drafting and Tool Design (TDTD) Alumni survey conducted April, 1997. The information received by its recent graduates indicates that the Technical Drafting and Tool Design program provides the graduate with an exceptional education. Alumni of the Technical Drafting and Tool Design program were satisfied with their education at Ferris, they were able to find: good well-paying positions, continue with their education, and seek additional career options by which the Technical Drafting and Tool Design program laid the foundation for. The survey results indicate that the Technical Drafting and Tool Design program at Ferris is a proven contributor of highly trained and educated graduates for Michigan and the region.

In the first section (page one) we wanted to find out information about the TDTD graduate.

Did you receive a BS degree from Ferris?

Yes: 71 No: 115

The Technical Drafting and Tool Design program is a solid provider to the 2+2 programming concept at Ferris. The following College of Technology programs; Plastics (5), Manufacturing (22), and Product Design (6) account for 46% of those going on for a BS at Ferris. The College of Business accounts for 10% (7) of those seeking a Bachelors degree in a business related field. The College of Education accounts for 44% (31) of Technical Drafting and Tool Design graduates seeking a Bachelors degree in Education.

Did you receive a BS degree from another university? if yes, name of degree and university.

Yes: 22 No: 155

Of the 22 yes replies, 5 indicated that they also earned a Masters Degree. Five respondents also stated they earned their degree from Western Michigan University. The following is a list of degrees and and universities of those that earned a BS degree outside of Ferris:

Masters Degree, Eastern Michigan
MA Ind ED, EMU
MS, Western Mich. U.
MA, Indiana State University
M.A., Western Mich Univ.
BSEET, Devry Institute of Technology
Finance, Walsh College
Industrial Supervision and
Management, CMU
BS Cons't. Eng'r., Saginaw Valley
State University
Oakland

Ag Engin., MSU
BS, Western Michigan
BSMET (Mechanical), S.V.S.U.
MFG. ENG - Western Michigan Univ.
BS, Industrial Arts
Athens State
Manufacturing
Western Michigan
BS Business Management, Gardner
Webb University
Business Education
B.S Education, Central Mich Univ.

What is your present job title?

Of those responding, 84 of 106 (80%) have titles that are Technical Drafting and Tool Design or closely related. Nine have titles from the business sector, while four have president and/or owner as their title.

Account Dev. Manager
Account Manager,
Account
Application Engineer
Application Support
Attorney
Business Unit
CAD Engineer
CAD Integration
CAD Operator
CATIA-Product
Co-President
Custom Products
Customer Quality
Design Engineer
Design Engineer
Design Engineer
Design Leader
Designer
Designer
Die Designer
Die Designer
Die Designer/Engineer
Director of
Draftsman
Draftsman
Draftsman/Designer
Electrician
Electronic Supervisor
Engineering
Finite Element
Journeyman
Lab Manager
Manager, CAD
Manager, Central
Manufacturing
Manufacturing
Mechanical Design
Mfg. Engineer
Mgr. Testing &
Mold Designer
Mold Designer
Operations Manager
Owner
Plant Manager
Plastics Engineer
President
President/Owner
Principle Quality
PRM Administrator
Process Engineer
Process Engineer
Process Engineer
Product Designer
Product Designer
Product Designer
Product Designer
Product Engineer
Product Engineer
Product Tool Engineer
Program Manager
Program Manager
Programmer/Schedule
Project Engineer
Project Engineer
Project Engineer
Project Engineering
Project Leader
Project Manager
Project/Design
Quality Assurance
Quality/Manufacturing
Sales Manager
Senior Engineer
Senior Printed Circuit
Senior Product
Senior Product
Senior Sales Engineer
Small Business Owner
Special Machine
Specialist Paint
Sr. Manufacturing
Sr. Mechanical
Sr. Mfg. Engineer
Sr. Mfg.
Sr. Process Engineer
Sr. Product Engineer
Structures Designer
Student
Supplier Quality
Systems Administrator
Teacher
Technical Director
Technical Sales &
Tool Design Engineer
Tool Design Engineer
Tool Design
Tool
Tool Engineer
Tool/Design Engineer

Tooling Engineer
Toolmaker
Traffic Engineering
Truck Driver
Vice president
Vice President, Eng

What is your employment address ? (location)

Of those responding 57 of 64 (89%) have ZIP codes from 46000-49999, indicating that the Technical Drafting and Tool Design program provides graduates to the region. Eight states are represented in the survey; Georgia, Indiana, Illinois, Colorado, Texas, Washington, Missouri, and Ohio.

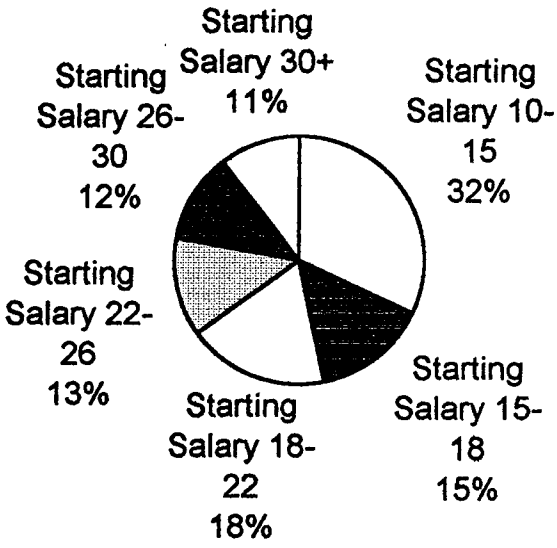
Americus, GA 31709
Atlanta, GA 30339
Auburn Hills, MI 48326
Auburn, IN 46706
Battle Creek, MI 49015
Benton Harbor, MI 49022
Big Rapids, MI 49307
Bloomfield Hills, MI 48302
Byron Center, MI 49815
Cadillac, MI 49601
Chesterfield, MI 48047
Connersville, IN 47331
Croswell, MI 48422
Dearborn, MI 48123
East Alton, Il 62024
East Lansing, MI 48823
Elkhart, IN 46515
Evart, MI 49631
Farmington Hills, MI
Flint, MI 48550
Ft. Wayne, IN 46802
Gladstone, MI 49837
Grand Haven, MI 49417
Grand Rapids, MI 49546
Grandville, MI 49418
Granger, IN 46530
Greenville, MI 48838
Holland, MI 49423
Howell, MI 48843
Ithaca, MI 48801
Jackson, MI 49201
Jenison, MI 49428
Kalamazoo, MI 49002
Kentwood, MI 49512
Lake Odessa, MI 8849
Lake Orion, MI 48362
Lansing, MI 48906
Louisville, CO 80027
Ludington, MI 49431
Mancelona, MI 49659
Mattawan, MI 49071
Middleville, MI 49333
Mt. Pleasant, MI 48858
Muncie, In 47307
Reed City, MI 49677
Rochester Hills, MI
Rochester Hills, MI 48309
San Marcos, TX 78666
South Haven, MI 49090
Southfield, MI 48034
Spokane, WA 99200
Springport, MI 49284
St. Joseph, MI 49085
St. Louis, MO 63116
Stevensville, MI 49127
Vassar, MI 48768
West Lafayette, IN 47907
Williamsburg, MI 49690
Wooster, OH 44691
Wyoming, MI
Wyoming, MI 49509
Zeeland, MI 49464
Zeeland, MI 49464
Zeeland, MI 49464

What is your employment address ? (name of company)

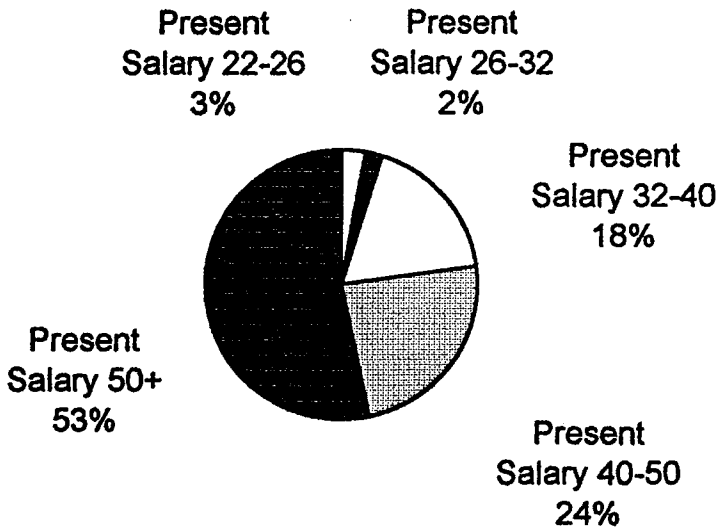
The Technical Drafting and Tool Design program has provided workers in the manufacturing arena with a broad cross-section. While dominated by automotive suppliers, in addition to: Ford, GM, and Chrysler, graduates have found work with consumer (Whirlpool) and aerospace (McDonnell Douglas Aircraft). The typical Tool, Die and Molding shops (both small and large) are represented as well.

Advantage Industries, Inc.
BOG
Borg-Warner Automotive
Center Mfg. Inc.
Chrysler Corporation
Classic Die
Cooper Tire & Rubber Co.
Crrekwood Design
D&J Tool & Die
Delco Electronics Corp.
Diesel Technology
Donnelly Corp.
DOT/FAA/Altanta AVN 303
Dowding Ind. Inc.
Dura Automotive Systems
Dynamic Tech. & Design
Enterprise Die & Mold
Federal Mogul Corp.
Federal Screw Works
Ford Motor Co, Engine Division
Ford Motor Company
General Products Corp.
GHSP Inc.
Gill Manufacturing
GM Powertrain Div.
Grant Traverse Plastics
H.S. Die & Engineering
Hanson Mold
Hart & Cooley Inc.
Herman Miller, Inc.
HI-Tech Mold & Engineering
Holland Hitch Company
Hydraulic Systems, Inc.
Hyron Plastics Group, Body Systems, Inc.
Infinite Concepts, Inc.
Infinite Concepts, Inc.
JRL Design
Kaiser Aluminum
Kent Beverage Co.
Lakeside Machine
Lakewood High School
Mac Engineering & Equip.
McDonnell Douglas Aircraft
Metalux
Metro Engineering
Michigan Plastic Products
Michigan State University
Micromatic Textron
Monarch Hydraulics, Inc.
Nartron Corp.
Nordlund & Assoc.
Northwest Tool & Die
Ogihara America Corp.
Olin Corporation
Pandrol Jackson, Inc.
Parker Abex
Plastic Mold Technology
Prince Corp.
Prince Corp.
Prince Corporation
Progressive Metal Products
Purdue University
Quantum
Riviera Tool
Rubbermaid Inc.
Standard Tool & Die
Steelcase
Steelcase GWF
Steelcase, Inc.
Structural Concepts
TechAid Automotive
Tokai Rina USA, Inc.
Trelleberg YSH, Inc.
Trio Mold & Engineering, Inc.
TRW-AEG
Vedco Inc.
Wayne Vaughn Equip Co. Inc.
Whirlpool
Wohlert Corporation

In response to the question: **What was your starting salary after graduation? 23 (23%)** indicated that they started above $26,000 per year. Those that indicated they started between $10-15,000 per year accounted for 33 (32%) of the respondents. Note should be taken that the sample data reflects graduates that graduated from 1972 to present.



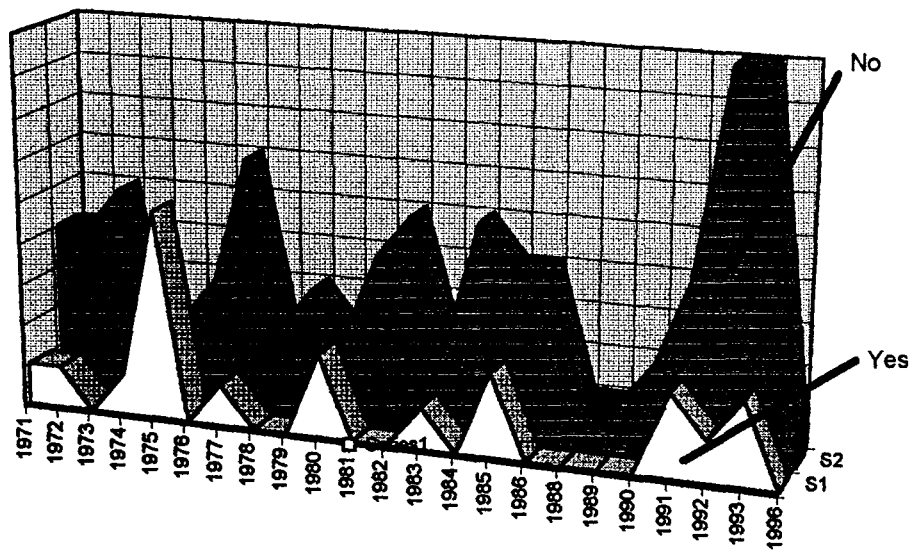
In response to the question: **What is your present salary range?** fully 56 (53%) respondents indicated that they are making in excess of $50,000 per year in salary. Five (5%) Technical Drafting and Tool Design graduates indicated that their current salary is below $32,000 per year, making 95% of the respondents earning $32,000 and above.



Was it difficult to find a position in a Drafting/Tool Design or closely related field upon graduation?

As the cross-tabulation chart below indicates, other than 1975, few graduates have found it difficult to find a starting position in the year that the respondent graduated. Technical Drafting and Tool Design program graduates have consistently found positions that meet career starting expectations.

Difficult to find a position in the Technical Drafting and Tool Design or closly related field?



Alumni Survey of Graduates

In the second section (page two) of the survey instrument, we wanted to gain information about how did Ferris' Technical Drafting and Tool Design program prepare the graduate for employment.

The first sixteen areas of section two dealt with specific program classses or areas of learning.

Of the specific program areas (#'s 1-9, 15 and 16), the Fundamentals of Drafting (#1) had an overwhelming response of 85% that the classes prepared them *To a great Extent*, with no responces of; *Neutral, Very little, of Not at All.* The second highest rating (68%) for *To a great Extent* was the Descriptive Geometry area which also had 27% indicating *Somewhat.* In the Design areas Tool, Die, and Mold Design respondents indicated 60%, 54%, and 35% respectively for the catagory of *To a great Extent.* The three CAD specific questions (#'s 2,5,& 6) had a more flat response with all three questions receiving responses from *Very Little* to *To a great Extent.* The flat response may indicate early training in CAD at Ferris while upon graduating CAD was not in demand as it currently is. MoldFlow (#16) was the only area that had both higher responses in the catagories of *Somewhat* and *Neutral* than in the catagory of *To a great Extent.* The numbers in the catagories for MoldFlow are not too surprising as many respondents do/did not work in the molding areas and even fewer would use or apply the technology. Comments the the last section of this survey support the responses stated here.

In the technical related areas, (#'s 10-13), the catagory of *Somewhat* is the highest response area, followed by either *To a Great Extent* or *Neutral.* Two respondents for Advanced Machine Tools CAM and three respondents for physics indicated *Not at All* for preparing them for employment.

In the general areas (#'s 17-24) an overwhelming 73% indicated that they would recoment the Technical Drafting and Tool Design program to a friend or relative. To Overall Technical Training 69% indicated *To a Great Extent* that the course knowledge prepared them for employment. An incredible 96% indicated that To a Great Extent or Somewhat that; In general, how satisified were you with your overall experience in the Technical Drafting and Tool Design program !

Data Totals and Percentages from Alumni Survey

Note: Percent of total Does Not include those that did not 1.) Take Course or 2.) Reply to the Survey Question.

About Your Technical Drafting and Tool Design Education

Based on your experiences and knowledge of the profession, to what extend did the course knowledge in the following areas prepare you for employment?

1. Fundamentals of Drafting (Board)

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	89	16				1
Percent of Total	84.76	15.24				

2. Introduction to CAD

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	32	19	5	3		47
Percent of Total	54.14	32.20	8.47	5.08		

3. Descriptive Geometry (board)

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	68	27	8	3		0
Percent of Total	64.15	25.47	7.55	2.83		

4. Product Detailing

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	55	43	4	2		2
Percent of Total	53.00	41.00	4.00	2.00		

5. CAD 3D Wireframe and Surfacing

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	18	16	10	6		56
Percent of Total	36.00	32.00	20.00	12.00		

6. CAD 3D Solids

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	17	7	13	7		62
Percent of Total	38.64	15.91	29.55	15.91		

7. Tool Design

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	63	33	7	2		1
Percent of Total	60.00	31.43	6.67	1.90		

8. Die Design

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	57	36	8	4		2
Percent of Total	54.0	34.0	8.0	4.0		

9. Mold Design

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	31	20	17	13	7	18
Percent of Total	35.0	23.0	19.0	15.0	8.0	

10. Basic Machine Tool Operations

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	33	53	14	4		2
Percent of Total	32.0	51.0	13.0	2.0		

11. Advanced Machine Tools with CAM

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	15	18	16	10	2	45
Percent of Total	24.59	29.51	26.23	16.39	3.28	

12. Physical (general)

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	20	43	28	9	3	3
Percent of Total	19.0	42.0	27.0	9.0	3.0	

13. Material Science

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	24	50	20	6		6
Percent of Total	24.0	50.0	20.	6.0		

14. Product Design with GDT

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	27	28	14	13	6	18
Percent of Total	31.0	32.0	16.0	15.0	7.0	

15. Product Assemblies

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	34	39	14	9	2	8
Percent of Total	36.0	41.0	15.0	9.0	2.0	

16. Moldflow/CAE

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	5	13	15	10		63
Percent of Total	11.63	30.23	34.88	23.26		

17. Overall Technical Training

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	72	29	3			0
Percent of Total	69.0	28.0	3.0			

18. Gaining a Broad General Education

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	35	54	13	2		2
Percent of Total	33.65	51.92	12.50	1.92		

19. Writing Clearly and Effectively

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	25	52	20	7		2
Percent of Total	24.0	50.0	19.0	7.0		

20. Acquiring Proficiency with Computers

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	25	25	13	9		34
Percent of Total	34.72	34.72	18.06	12.50		

21. The ability to learn on your own, pursue ideas, and find information you need.

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	41	46	11	2		6
Percent of Total	43.0	45.0	11.0	2.0		

22. How effectively did Ferris prepare you for employment?

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	56	39	7			2
Percent of Total	55.0	38.0	7.0			

23. In general, how satisfied were you with your overall experience in the TDTD program?

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	72	27	4			1
Percent of Total	70.0	26.0	4.0			

24. Would you reccommend the Tech Drafting/Tool Design Program to a friend or a relative?

	To a great Extent	Somewhat	Neutral	Very Little	Not at All	Did Not Take Course / No Reply
# Respondents	78	18	7			0
Percent of Total	73.0	17.0	6.0			

Alumni Survey of Graduates

In the third section (page three) of the survey instrument, we wanted to gain comment information about the Technical Drafting and Tool Design program in terms of; the most and least valuable part of coursework, what classes should be added, what did respondents think of the facilities, what trends do they perceive affecting the Technical Drafting and Tool Design program and open general comments.

A summary and specific comments follow on the next page.

1. What so you believe was the most valuable part of your coursework and why?

Of the 157 written responses to the question ***What so you believe was the most valuable part of your coursework and why?***, 50 respondents indicated that Drafting (among other courses) was the most valuable to them. An impressive 71 indicated that the design component was the most valuable. The combined Board and CAD fundamentals response comprised 39 respondents to indicate that those areas were most valuable. Twenty-six indicated that the Lab aspect and 11 indicated that stressing fundamentals (standards) of Technical Drafting and Tool Design program was the most valuable. All major aspects of the program were indicated to be important at one time or another. Many instructors were identified, as well as their industrial experiences, as contributing to the overall importance of their coursework. Related classes (material sciences, machine tool) as well as physics and math were also identified as very important to the overall value of course work taken at Ferris.

Stated responses are as follows:

Actual experience drawing and designing, working with machinery, material science, physics all helped work with real world design problems.

The applied courses (not all Theory). The labs really drove home the work we would be doing in our careers.

Descriptive geometry, tool (fixture), and die design - being able to visualize in your mind (3 dimensionally) what you're designing prior to drawing was and is a necessity. Tool and die was very well geared toward learning the design trade, but also toward engineering other mechanical devices (material handling; machining operations).

The time spend on various course tasks. It provided a large amount of experience.

Sound drafting principles

It was a long time ago when I attended classes at Ferris, but I remember that I enjoyed the entire program. It gave me a good foot-hold to start with.

Labs, and working on real problem applications. Putting the text work to practice.

Manufacturing processes, CAD machine tool operation statistics/strengths.

Relationship to trade was a great asset for me to be able to understand the need to learn and apply that subject.

Design classes.

Drafting lab 4 hours per day.

Learning to find information on my own. Because I am required to look for information on a lot of designs. Ex: Bearing selection; seal selection, fastener selection.

Descriptive geometry- to better understand 3-D objects.

Detail work and training development of "eye" for detail. Each term, instructors set out new and differing design STD's for us to follow, making us flexible to pick up future employer's STD's quickly.

Classes of a technical nature and the more advanced science classes.
Drafting - geometry fundamentals are important!

I believe the instructors were the most valuable part of my classes. Don Rynearson and Gray Bradt made class understandable and fun to learn. Bob Carlson on the other hand, made life and his classes fall short of my expectations.

Having Mr. Eldridge two terms out of three instead of having Todd Rose (I learned 75% of what was potential my first year, 66% Mr Eldridge: 9% Todd Rose).

I know that the board time was what gave me the best understanding of drafting and design skills.

Machine tool class because it gives a person a better understanding of what it takes to machine a part.

At that time ('76) the board work.

The attention put on finding a practical solution to problems instead of stressing theory.

Strength of material classes, and drafting. I used these a lot.

Fundamentals of tool and die design.

Mold and die design. Every product designed must be manufactured. Mold and die design ensure detailed understanding that something being designed is manufacturable.

<u>"Attention to Detail"</u> The most critical piece of course work was the descriptive geometry. The reason I feel this was the most important is, it taught all of us to be detailed oriented. The other reason I think descriptive geometry is critical to keep is, it taught all of us basic design elements to aid us when we were using the computer.

Actual board time using real parts/tools - shop classes and metallurgy.

Speech, because I use it daily. Drafting because I made me pay attention to detail.

Details and professionalism. As retired military this helped my career.

Variety of classes prepared me for employment.

By far, the four hour per day drafting and design labs. The experience gained prepared me well for my career in the field.

The lab work and the amount of hours that was spent on board work, getting familiar with the machines and the tolerances that they associated with.
Die design.

Depth in design and drafting, ME's don't have this skill.

Labs

The extensive "board hours" - actual time making drawings.

The experience of college in itself.

Having some instructors who came from industry. They could teach what was needed in the "real" world.

The knowledge learned with "hands on" experience in design (not a lot of book work only).

Mold design, descriptive geometry. Mold design is part of my career and descriptive geometry was very interesting.

The basic drafting fundamentals that are stressed at Ferris. There are a lot of people in the trade from different schools and back grounds. A lot of times you can tell when someone did not go to Ferris by their lack of correct technique (Ansi Standards, etc.). In general, the best designers we have at U.S. Die went through the Ferris program.

Math classes (all of them). Math through Trig is used almost daily.

My training in how to design tools and dies.

Given a project (drawing) with a deadline and it was up to each person to set their priorities to accomplish it.

Mold design, geometric toleranceing, metallurgy (Dave Anderson).

Detailing, drafting, and design classes, they are what my employers are looking for.

Hands on training.

On the board experience.

Fundamental drafting and design principles.

The time spend on the board with descriptive geometry.

All drafting courses, taught thorough and complete thought processes taught tool mechanics.

All the labs and related courses.

Design course.

It was all very good, but the drafting and machine shop classes with teachers that had lots of actual work experiences. I feel this helped their teaching practices a lot.

Many of the instructors had industrial experience.

Technical writing skills, drafting skills give me an edge over other college preparation.

The most valuable part of the curriculum was the discipline. It was easy to get in (although there was a six month waiting list) hard work to do well and gave me a great sense of accomplishment.

The tool and die design labs. They taught me what tool engineering was and the basic fundamentals of how to do it.

Designing on the board and having to design with components reference in catalogs.

Tool and die design.

Drafting courses and math.

Having experience instructors.

Thrust into college environment and you either had to sink or swim - learn to be a survivor.

The four-hour drafting labs were helpful in preparing student for a long work day. For the most part, the instructors were knowledgeable and able to teach students the material successfully.

The intense training in technical drafting and tool design practices. Exposure to strength of materials, physics, and hydraulics.

Fixture design, use at present job.

Extensive board work.

I feel the increasing levels/complexity of basic drafting skills (board), was the most valuable part of my course, because I was able to design and detail without any problems what so ever, when I got my first job.

Jig and fixture design. Prog. Die design.

The fundamentals of drafting and description geometry were the most valuable in my opinion. The above courses prepared us to relate and create designs throughout as we progressed to the computer.

The four hour drafting labs were very beneficial because it gave hands on experience in the direct field of study.

Mathematics. I didn't do good in high school.

The math, physics, and stress analysis.

All of the technical related courses (drafting, CAD, metallurgy, machine tool, etc).

Ferris has/had great technical program which got you to the door. Great instructs with real experience.

Drafting - that was what I wanted.

Drafting, lab time was extensive providing opportunity to enhance skills.

Amount of time spent on the board.

The required long lab hours - the real world consists of 8 hr days not, 1 hr classes.

All

Actual drawing experience on the board for a good length of time.

Labs gave us hands on experience which proved more valuable than theory only classes.

The different types of tooling designs. There were 3 areas you could look for a job in.

Descriptive geometry and math along with the die design helped a lot to project and layout parts for die processing. We also used a lot of math to check angles and sizes.

The intense course load in a two year program.

Jig and fixture design and die design. Both courses used actual shop applications, Jig and fixture instructor made you turn in major project each week!

Die, mold, and tool design these concepts can be used in any areas of manufacturing.

Extended periods on the board. The drafting classes themselves gave me a confidence when entering the job market.

Board work - use every day/don't lessen calc. classes I took to enter engineering because computers are being used primarily (ie. Still need to know how to do division by hand as well as w/calc.) Small classes, etc. made things easy to understand. Ms. Allegreto was an excellent teacher!

Board work/drafting skills, just because you may be knowledgeable on CAD, doesn't mean you can dimension a part correctly, taking tolerances and assembly into consideration.

The technical classes directly associated to drafting and design.

The hands on lab. Spending time to follow a project to completion.

Interaction with inspiring instructors who opened doors of opportunity for me which led me to further education and success in other fields.

The board work and the knowledge the instructors had on the subject of design.

Extremely knowledgeable instructors.

Basic drafting fundamentals and also GD.T. That is used on all designs and blueprints at out plant.

Descriptive geometry because it is the basis of design.

Boardwork

It wasn't as much the class work as it was the outstanding people who were teaching the program. George Nicholas, Don Rynerson, Bob ??, Gary Bradt, Doug Chase, and Sam Peticolas taught us what it was going to be like in the field. They taught integrity, self reliance, personal responsibility, and professionalism. These were great men who believed in what they were doing.

All of the course work was valuable because if you move from industry to industry you need change, but the training is broad enough that you can adapt very quickly.

Drawing courses, which prepared me for product design and development, which has been my career focus.

The second year tool design lab class. This was directly related to the type of work in my employment.

The actual drafting courses helped most.

Tool design/mold design/technical writing. Small class size and availability of professors during and after class. Field trips that exposed the class to the real world.
I learned how to draw, detail, and dimension prints. Toolmakers could get the info they needed from my prints. I understood 3-D space even though CAD was not yet available at Ferris.

Good work ethics, understanding of machine skills, strong connection to real world ways of doing work.

Drafting basics that apply to all fields.

Descriptive geometry, die, jig and fixture, and shop classes. The knowledge of tooling makes a better product draftsman.

Tool design: this is an area that, while strong at FSU, is weak at other schools. Employers see, and value, this.

Early morning classes, I'm an a.m. person.

Engineering related classes like statics and strengths, metallurgy. Just knowing how to detail and draw tools is not enough in providing strong tool design.

The technical and drafting classes. You have to be able to prove your self valuable to a company or you won't last long.

In my case, learning the fundamentals of drafting and thought process required to develop a good, sound design.

Had to work hard to get good grades. Were expected to work and dress (that was 1967) like was to be expected in industry.

Structure of the courses (routine).

Descriptive geometry was probably the most valuable course I completed at Ferris. It opened my mind's eye to the ability of seeing things in a new perspective, and aids in problem solving.

Sticking to the job of "starting the curriculum and completing them".

Authentic assessment, it was the rem thing.

The manual drafting labs because they gave me the ability to perform my job on the board, plus they give a good foundation of drafting principles that can be applied when using CAD also.

The block time frame for the major area.

Tool design - CAD, I use it the most.

Drafting lab and machine tool operation. Both prepared me for current position ability to read all kinds of prints helps everyday.

Drafting, because it encouraged thinking in terms of spatial relationships.

It is hard to pick one item as most valuable. The complete package gave me a good foundation on which to build a career.

All of the drafting classes outlined. I have used the principles I was taught. I take them for granted.

Problem solving.

Drafting labs - Samulok and Carlson were terrific instructors because they had industry experience.

Fundamentals of drafting - gives you a good understanding of what drafting and design is all about.

The board work was the best; make them do lettering keep it all technical in all classes. CAD is the way to go. A must.

Four hours of board work per day. Board work forces preparation where it in most important.

Broad range of general studies along with the technical courses to round out ones education.

The mold design and die design - because these area's were most likely to relate to employment with assoc. degree.

I had an excellent instructor. Drawing time. Mathematics.

Practical hands on approach to learning.

Practical application of course work in the labs was an excellent way to gain confidence and proficiency.

The drafting fundamentals for basic skills really gave me a good background in general drafting practices which have helped me to train others and improve our engineering team's skills.

Mold design course best prepared me for employment in plastics.

Math and accurate board work, the employers liked it.

The amount of hours spent in the major area.
Actual drawing layout and design. I now use ACAD, but the basics are still the same as board work. Also, the math and physics were great help.

The "core" curriculum because I had had only a nine week drafting course I junior high prior to coming to FSU.

Basic drafting principles (descriptive geometry and design series). Visualize realworld to 2-D part spec's.

The amount of class room hours in major class areas.

The most valuable courses were drafting labs, machine tool classes, welding classes, and the applied statics and strengths of material type classes.

Mold and die design classes. CAD.

Experienced instructors (industry seasoned).

Broad technical knowledge in die design, mold design, and tool design. Machine tool operation.

Auxiliary views - since my schooling was before CAD/CAM was used at FSC this basic instruction prepared me for 3D software I have used in the last two years.

GD&T, material science, die design. I use this information every day.

In class labs, was able to learn by doing it myself, and there was someone to help when I ran into a road block.

Machine shop practices and lab adds a dimension to designing that other schools omit.

The drafting and tool design because my drafting skills were enhanced and was taught the basics of tool design.

Use of modern equipment.

Second year design courses.

Statics and strength of materials/metallurgy, fluid power. These classes prepared me for assignments beyond normal drafting duties. They were of an applied and practical nature.

The basics, tool design, dimensions, and especially the CAD work. Without two basic understanding of how things work and why it is hard to learn and adapt to working environment.

Student teaching - experience on campus.

The general understanding of drafting and a special note on the computer end of the education.

Drafting labs that would now include CAD.

The practical application in working with actual parts on the board and the "hands on" running of the machine tools.

Machine shop classes/welding and metallurgy.

2. What so you believe was the least valuable part of your coursework and why?

Of the 108 respondents to the stated question ***What so you believe was the least valuable part of your coursework and why?*** 8 stated "None, Use it all" a or very similar comment. Twenty-seven indicated that classes in the General Education area were least valuable. Specifically in the major area, MoldFlow was indicated as least valuable. Related classes; material science, and strength of materials were identified as least valuable. While 10 respondents indicated that a particular course was not valuable, they also stated that they were not part of that particular industry, ie MoldfFlow not being important while working in the Die Design field.

Social studies class. Was very boring instructor. Mr. Gray funny to remember 25 yrs later.

English, some math, unrelated classes never used.

Humanities, made me smarter, but it doesn't help in design of refrigerators, heating, or other systems.

None of it. Program needs to be expanded to four years to allow more in depth study!

I use it all.

Kinematics (never used it) and metallurgy (at entry level positions - rarely required).

Some of the humanities courses, not relevant to a technical field.

Metallurgy - boring class.

Health class.

Moldflow analysis - at H.S. Die, we do no MoldFlow. Parts not requiring Moldflow are gated and given runners either due to past similar molds or by customer request. The parts requiring Moldflow are done entirely on the outside, usually by P.E.T.S., KONA, or other manifold providers. While I feel it is necessary to have a basic knowledge of what Moldflow is, I feel that spending six weeks of a CAD mold design class on Moldflow is a waste of time.

Electives

Having some instructors that were pressed into service teaching classes in which they knew little. It was a waste of my time and money and it was knowledge I should have gotten from the program.

Too much time on jigs, fixtures, and die design.

Was all good.

Business machines, (they were outmoded at that time).

The technical writing course was lacking, but I do feel this is an important subject. Better training in writing memos and reports would be helpful.

Duplication.

I feel all courses have been a benefit to myself in my current position.

Fixture design - very specialized and done by few people. On a large scale basis (OEM Assembly fixtures) this class wasn't applicable.

Lettering.

The general education classes, and gym classes.

Social Studies.

The general education, phys., P.E., etc..., However, it was still good to have in program.

The behavioral science class that was required.

I think it was all valuable. Each class had something to give and all were useful for knowledge.

All were good.

Sociology and humanities.

Business machine requirements. Within months of graduation, technology was obsolete.

Humanities - no use what so ever.

The speech class that I took because the teacher was obsessed with the history of speech giving and not the ability of the student at public speaking.

Lettering and line quality!

Political science - had enough in high school.

At the time it was office machines, today I do not know what the course out line includes.

The strength of materials and metallurgy - not enough class time in lectures or labs!

Drafting and math applies to all fields.

All the technical courses were valuable. I don't believe physical ed classes were necessary.

There was a very stupid calculating course required at that time! It was such a waste of time!

Due to the large amount of credits in the course structure I felt that elective classes and P.E. were unnecessary.

At the time of my education, data processing. I received no quality computer training - knowledge I've had to acquire on my own.

Phys. Ed.

Education classes - information was boring and not useful for teaching.

Political science! Doesn't apply to what I do.

Moldflow analysis - there is no current application for it in my position.

It was all worth while.

At the time that I went through the program the general ed classes were at the same level as high school. It made passing them too easy.

Orientation class.

The English, history and other elective type of classes, not directly related to technical subjects.

Electives!!

Plastics - because I don't use them - was a good intro - showed me that wasn't what I wanted to do.

Humanities. Even though it gave me some knowledge in general studies, it wasn't in practical knowledge I could use.

Descriptive geometry, reason really never understood purpose.

Political science and government, because I had already had almost identical classes in high school.

Welding - not enough class to learn all that was needed to know. Also, metallurgy need to know more about different materials and their properties.

Political science

Mold design - only because I am not in the plastics industry.

Strength of Mat'l, have not needed to apply principles learned.

More business management needed.

General studies/electives - they have had very little impact in my career.

The courses on welding and machine shops.

For myself it was all valuable.

To me it was metallurgy. But, I believe it is still very valuable to the total course.

I feel the strength of materials course was the least valuable, because in our company we have material engineers to do those types of jobs.

All of the course work was valuable. I have used all coursework at one time or another.

Golf. Don't golf. Why phys ed?? You can work out on your own time.

General ed. courses (English).

The non-technical classes (humanities, etc.) But, I don't remember anything about those classes, or even what classes I took.

All I took were useful.

An associate degree in TDTD with engineering classes is good but without working in the industry you get disappointed due to the fact of the engineers it is a very fine line.

Office machines.

Certainly the course must have changed in the last 20 years, but the courses I took were an excellent overview of the manufacturing processes and environment. All the classes played a roll in my work experiences and none should be diminished.

Classes on saturday morning!

Nothing that I can think of.

I think that all parts of my course work are and were important and valuable to my own line of work.

The elective courses. They had nothing to do with tool and die.

Basic drafting courses. I had learned the basic lines/sectioning etc. in high school.

Coverage of related fields (metallurgy, etc.).

Geography it had nothing to do with my degree.

General education courses dulled in comparison to the technical courses. But, I had a lot more interest in the latter.

All those social science classes I had to take. Didn't learn much for my future.

Personal designer CAD software. I have not seen this since I left FSU.

All was/is important.

Number of classes (drafting) still done on the board. Boards seem to be obsolete, but one class with board design would be good for understanding view projections.

Metallurgy class was very poor and this could be a very beneficial and important class if done properly. Topics not covered were tool steel application and coating techniques to improve tool life.

Tool design, dealt w/ cutters, no need to emphasize so greatly, but more function and application. Also, molds, dies, etc., more are also tools. (Greatest disappointment here!) ATC facility weakest here also!

Can't recall any.

Lettering not a real need (computers).

I believe that any course can be valuable if it's taught correctly, however, to me, "social" classes were usually "blow off" classes.
Health classes, who really needs them in college?

The machine tool classes were to basic to gain any knowledge.

Electives, not many choices.

Most electives and statics/strengths of material, which may no longer be required.

Physics, too many hours for this class.

Basic tool operations - because understanding how a part is made has nothing to do with you operating a machine.

General education classes.

Phys. Ed.

It is usually humanities classes. I would rather fill that time slot in with a class beneficial to the core of the program.

Metallurgy, I have taken several and none of them have taught what I need to know in industry. This I have mostly learned through experience. When to harden materials and what materials to use for the different applications.

Probably humanities courses because I did not see the need for them and had no interest in them. That is not to say that they are not valuable though, just that I did not see value in them at the time.

Humanities classes and English/writing, just don't use them very much.

Descriptive geometry. I don't use it.

Office machines and basic math courses.

Some of the general education classes in the humanities/behavioral sciences areas are really unnecessary. There was little value in these classes.

Business machines.

Computer aided die design was my least valuable course. This is true only because it involved a progressive stamping die and my area of employment is mold design.

The use of basic math and the correct way to letter!!

General education.

I felt that the program at the time I took it was appropriate for the most part with the exception of a welding class I took that did not include a lab.

Some of the general education requirements. Because they are not used in my field of work.

Anything dealing with 3-D on CAD. At the time I took these classes we simply drew the parts and made wireframes. It would be nice to see the interface to machine tools to see an actual part produced using CAD data.

Arts and Ideas.

3. Please list any other course(s) that you think should be included in the program

The varied responses to the question ***Please list any other course(s) that you think should be included in the program,*** make it impossible to state a universial theme. Statements from:Self Esteem, Career Goals and Setting, Employee Relations, to Analytical Team Problem Solving, Business Law, Project Management, and statements in the technical areas of DFM, FEMA, RP, SLA, CAD, CAM, GD&T, TQM, and ending up with "more advanced CAD, Solids, etc." indicate that the Technical Drafting and Tool Design program serves a basis of many areas that our grads end up working in.

All the latest CAD and CAM possible. Speech Classes! Sales Courses!

Program Management Courses, Advanced computer classes (Spreadsheet, & Microsoft Windows), Advanced CAD w/ concentration on surfaces and wireframe.

Current job at Cooper Tire & Rubber Co. I feel that the young draftsmen (Drafts People) lack good drafting skills. They know how to operate the computer however. I hope Ferris is teaching good drafting before the kids learn the computer.

I'm not familiar with the current program.

More math, courses to incorp. a broader understanding of engineering, ie. Testing, materials, quality, quotation, etc.

Proper writing and communications skills. Public speaking. Business courses like how to run a small business, understand bookkeeping and how to structure a company to protect it from the Federal Government. CNC Machining, NC Programming.

More machining classes - to actually see how fixtures, etc. Are built. * Welding class to see how much parts warp when welded or cut w/laser.

Pro-E.

1. Computer Classes (of course) CAD, Programming, etc.
2. More emphases on writing skills (Technical).

Advanced, Multiple Tool Molds.

I am not up to date with the Program today. I have interviewed a few people that have graduated from the program in the last 5 yrs. & it looks like it is up to date with the field I am in.

Press Automation.

More emphasis should be put on cutting tool, Gage Design & GD&T.

It would be helpful if Tool Designers could spend an extended time also learning tool making skills.

Cost of materials that are chosen in designs.

I'm sure now include CAD Classes, which were not available in 1977 (and didn't need to be then). Geometric Tolerancing. Possibly some type of management course to prepare for Project Management.

Business Communication.

Learn about basic plastics and more about metals.

Concurrent Eng. Techniques, Synchronous MFG. Principles, Team oriented approach to Product Development.

Materials:

Today - We all use Auto-CAD - I assume this has replaced drafting. Computer Training - Microsoft office, Business Communications Electronic document control. Business Management Course.

A more intense or in-depth study in the tool, mold, jig, fixture design areas.

Business Management, How companies make money, Labor relations introduction.

Economics.

3D Solid Modeling, 3D Surfaces, 2D Detailing (Computer), Data Management Courses, Knowledge or Training of Different Computer Systems (CATIA, UNIGRAPICS etc.), Geometric Tolerancing, Oral & Written Skills.

Intro. to CAD, More Machine Shop, More GD&T - Quality Gages and Design, Plastic Mold Exposure.
More personal and networked computing training is a definite industry plus. Relational CAD software is also a growing industry standard.

I do not know what the current course of study includes. Several <u>different</u> CAD Programs are a must (ie. AutoCAD, generic CAD, MainFrame CAD) Also Physics, Calculus and strength of materials.

Include some tool design and skills for speaking to a group of people.

I don't know the current course list but with the advent of CAD, Descriptive geometry has little application and computer skills are very important.

More studies Re. Quality w/Re. To Ppk,Cpk, Loss Function & X-R Charts. Most MFG. ENG. I work with don't understand these important Analysis Methods.

I hope you have CAD classes & good systems & Programs.

Automotive Body Design, CATIA - Computer, a four year design degree and than a Masters.

Not familiar with present curriculum.

Computers, Computers, Computers! Internet, Web Page Design, Programming, etc. Internet file Transfer (FTP), Systems Networking.

GD&T should be a must! CAD use as a design and drafting tool - Both 2d and 3D.

How mush "Plastics" is involved in the curriculum.

I am more concerned with topics & content than course packaging. See Topic List on pg2.

Beginning Calculus and Calculus II.

FEA (Finite Element Analysis).

CAD (Solids), Logic.

More Programming Tool Motion over Wire-frame.

Designs for Manufacturing.

Interpretive Blueprint Reading?- How to "Read between the Line."

Computer Aided Manufacturing, Numerical Control, Quality Control.

CAD.

Extensive materials background for Gate Dim, shrinkage, abrasion, etc. (Plastic)(Diecast), Mold/Die Troubleshooting, try to find problems before they are built in. FEA, Moldfill, Moldcooling Analysis (Much more in-depth).

Technical Drafting & Tool Design

APPC 1997-1998

section 2 of 3

Process- Metal stamping(s) and Plastic Injection - Basic courses that will help the student know more (not all) about the process(s) that the tools are designed for. What does Hi & Low annual volume mean to the design?!

Since I am not working directly in this area it is hard to say. The MFG. Companies can best answer this.

Unigraphics, Electrical Diagrams.

Solid Modeling.

New Design Materials, Tech Writing, Bus Law.

no ideas.

Analytical/team oriented problem solving. Psychology of Teams (Multidiscipline with consensus training).

Mathematics on an engineering level. College physics and general science. Add co-operating education, on the job experience for a minimum of one quarter.

Metallurgy.

A business course in managing & organization.

Intro to computer science instead of the Basic Programming Course.

Not very familiar w/current curriculum.

Blueprint Reading & Making, introduction to controls(ie. Electrical-Hydraulic) design in today's world too many (mechanical Designers have no knowledge of what it takes to move the parts they design.

More business writing classes.

Applied Trigonometry. Rapid Prototyping- how to get maximum benefits & incorporate into production tooling.
A course in Time Management/Timeline would be advantageous. This is lacking, and I can see students either taking on too much & getting overloaded, and/or not taking on enough and thinking "no work" is OK at times.

Computers, general business letter writing, Employee Relations.

Classes Based on: Self Esteem, Career Goals and Setting them, Positive attitude or direction.

Although we had a machine shop course, it was late in out program. I would have learned more about detailing had I had a better understanding of the machining processes that would be used to make these components.

More background on Fluid Power, Pneumatics, and their associated products and how to incorporate them into Ass'y's.

It has been too long to comment.

3D ACAD & Technical Writing (Advanced Classes).

More hands on work with assemblies. Have projects that need study in Fit, Form, Function. Too many drafters can make pretty pictures but do not have any idea how things are made, processed, assembled, and used.

Plastics courses with Mold design.

Statics & Dynamics.

Some emphasis on plastics.

Quality control/S.P.C Introduction.

Plant Trips to Machining & Assem Plants.

Courses? More in-depth study of current course work.

Calculus/Physics at least (2) terms.

Something to do with Purchasing Materials.

Not totally familiar with program today.

More strength of materials, structural work.

Physics, see above comment (previous question). A machine design class that helps the designer size tools to a proper machine (ie. Forming loads) Basic components of a machine you are tooling.

I am not familiar with your current program however I would recommend using work study at an actual company to gain hands on experience that benefits everyone.

AutoCad, New product development.

A GD&T course would be beneficial.

More relationship courses (TQM - Cooperative Training etc.).

More CAD/CAM.
I really don't know what is in the course work any more- it's been 28 years since I was involved in it and I'm sure it has changed considerably since then with CAD/CAM etc.

More statics, dynamics & stress analysis. Work study programs. More exposure to actual working environments.

Coordinate measuring and coordinate measuring machines. Just understanding how they are used. Understanding Quality Control Methods, such as SPC.

Time Estimating, scheduling (Bar Chart), Project Management, and Time Management.

Plenty of emphasis on "CAD" but still need to be able to produce dwgs by hand.

Design course with real life situations, your given a part or parts to design within a certain package area, all the way through to manufacturing the part (possible to even mold or die stamp).

More hours in materials & GDT Machine tool class (operation), more English classes and technical writing.

Intro to Plastics, materials & Basic Molding.

How to take a interview. Confidence building course.

Cost estimating course for Dies, Molds, Gages and Fixturing Etc.

Both Drafting and CADD are important in combination.

Production Processes! MFG - DFM.

I think the following classes should be mandatory. 1) Welding Classes = (3) classes 9 credits total. Hands on. (2) Machinist Handbook. (3) Machinist Math. (4) Internship. Plastics (general), Prototype Methods.

Communication skills are very important for advancement. More "machine tools" Hands on. A designer/engineer must understand the methods of machining.

Autocad.

More CAD/CAM Classes.

See general comments.

I believe more machining classes would be helpful.

CAD, CAM, Internet, basics of structural, chemical, mech., engineering.

Little time is available to add to An already busy schedule. Might consider more required time "working on own" after scheduled class in order to allow more physics type classes ie. Question #1. Also integral to existing classes additional requirements for technical writing and public speaking.

More attention to how things are machined, what it actually takes to cut/create a mold, not just the cavity.

Maybe a more variety of computer drafting programs of different backgrounds.

I am not that familiar with the present course makeup but would recommend at least some board work, TQM and lots of teamwork.

More: -FEA *Tolerance analysis Monte Carlo Simulations *GD&T, specifically how to layout a part and how that dictates the use of GD&T.

Finite Element Analysis, Mold Analysis, NVH & Stresses are critical today.

No comment - don't know the program & its studies as of today.

Autocad.

I am not familiar with the current curriculum. Any 3D CAD will be a great benefit.

Two courses in Body Design.

I am not familiar with the current coursework, but as I hire new employees, I look for people with strong computer skills, mechanical aptitude, strong teaming skills, and the skills to write engineering documentation.
Cost estimating courses.

Layout and detailing of welding presses cutting body panels doing sections.

4. What did you think of the TDTD facilities?

In response to the question ***What did you think of the TDTD facilities?*** the over whelming response was; good, great at the time, very good, excellent, etc. Several respondents stated that the CAD systems were "pitiful, in need of updating" etc. Several respondents indicated that computers were not available all the time. General comments as to stairs, lack of heating, and quality of boards, were mentioned once each.

They were fine when I was there, I have no idea of what they are like now.

Very Good.

Good.

Seemed to be well-maintained and state of the art (in 1984).

Good.

I have hired 4 graduates all working in Huntsville Alabama Chrysler Huntsville Division.

Good.

OK, but too far from South Bond Dorms & Dinner Hall.

Great.

O.K.

It was great.

I have not seen the facilities in several years so I cannot comment here.

Very good.

I haven't been back since 1971.

Excellent @ that time.

At the time, one of the best in the state.

Good.

Very good in early 70's.

At the time I was impressed with them.

Excellent.

(1974-1976) More than adequate for Manufacturing Drafting. CAD/CAM was just be introduced.

OK.

I'm sure that things (CAD, etc.) have been improved, kept up with technology over the years. While in the TDTD program the facilities were fine.

Good.

Just great.

Need more hands on, actually building our designs.

They were very good.

Excellent basis for continuing education, world-class equipment and staff.

Excellent!

Good Facilities.

At the time I graduated they were somewhat limited but they were upgraded shortly after that.

I have no problems with the program then or now.

They were new and excellent when I graduated.

Good. They expanded with the times.

They got the job done.

At the time I attended they were excellent.

Good, needed more computers. Adequate.

Excellent.

Don't know haven't been back.

Well, we did the best we could with what we had. The drawing boards were old but George Nicholas always said, "Anyone can make a drawing look good on a nice board and a drafting machine, nut it takes real talent to make it look good using a piece of plywood and saw horses."

During my time they were good.

I thought that the facilities were well suited for the way the program was setup at that time.

Adequate.

Good for the times.

When I was there 18 years ago, they were just fine.

They're adequate. Computers have to be upgraded frequently (software too).

Excellent at that time.

I haven't seen them in years.

Great.

Excellent!

Industry Compatible.

Overall OK, I hate the stairs in Swan - 5th Floor for (2) years!

Cad area was really nice, some time constraints. The second year drafting was better than the first year, such as boards and equipment.

They were adequate.

Very nice.

I thought they were good for the time but I didn't have much to compare them to.

Good for 1976. Hope things have changed greatly.

Minimum Resources, fair facilities.

I remember the design labs having all the equipment (except our tools) that we needed.

Attended FSU - 1967 -1968, Graduated FSU - 1983 After Transfer of Classes under GI Bill.

The facilities were terrific, if we could have had multiple CAD Pkg's it would have been better, but I don't know if we would have had time to get familiar as much as we did.

Good.

They were fine at the time I was there CAD design had not started.

Good from what I remember.

Good in '76 & even better now w/CAD facilities.

Satisfactory.

Satisfactory (+)

Good.

They were well above average.

They were excellent in 1975, based on all design work being done on the drawing board.

Old & outdated at the time.

Very good.

The last time I visited Ferris has been over ten years ago. I'm sure the facilities have changed beyond my imagination.

At the time they were state of the art and well supported.

In 1977 I felt they were old and outdated- I have not been back since. I would hope they would be all computer based with a better machine shop and Processing area.

Fine.

Good.

Great.

When I attended - the computers were very old, outdated, and crashed a lot. I realize that as a University with limited funding you can't afford to buy new Sparcs or SGI

Boxes. I also think they changed over computers the year I left so maybe I was just there at a bad time for the computers.

Adequate.

N.A.

OK.

Very Good.

Good faculties and available resources. Updating the various CAD systems was a pitfall.

OK.

Fine.

Great!

Great.

Excellent.

They were good when I attended & they have kept up to date since.

Very good.

Up to date & taken care of.

Good facility.

I haven't seen them in a number of years.

Very adequate.

Excellent environment met all needs when I attended.

Excellent.

OK not great.

When I was there the facilities were lacking, it was just drafting boards and a few Tandy computers downstairs, from what I've seen in brochures you have upgraded the facilities greatly.

They were excellent when I was there.

Acceptable mechanical drafting equipment excellent CAD facilities.

Very good at the time I attended. I would expect that students would be acquainted with the latest high end software (Pro-E, Catia, etc.).

Have not seen the new building.

Excellent.

I have not been back in over 10 years. But I would like to see how things are set up.

Great at the time I have not seen the facility lately.

Good.

Excellent.

Good at the time. More emphasis should be put on being computer literate.

Top notch!

Fantastic and I'm sure they are better today!

I thought that the TDTD facilities were very helpful and open to my needs.
Since I left, but more computers with easier access is a must.

Excellent. During my time at Ferris it was the entire 5th floor of the Tech building.

Very good.

I thought they were fine.

See general comments. Facilities in 1975 were great.

Real good.

Good overall.

I haven't seen the facilities for over 20 years. At the time it was very current.

Up to date, All TDTD Classes in one building (good!).

The school of TAA was very spartan when I graduated. Ferris State College in general was in a tight spot financially at this time due to the economic conditions in the state of Michigan.

No CAD at that time in 1983.

Excellent at the time.

Cold in winter.

Very nice.

Nice, neat, & clean back then.

The board drafting facilities are both sufficient & necessary to gain the drafting fundamentals. The CAD facilities & software could be updated to include more solid modeling & CAE capabilities.

Excellent.

Housing and related commons were satisfactory
classroom - design was primarily on drafting boards which were adequate when compared to today's PC systems.

Its better than what we had. I think.
Fair program to start your education in drafting & design.

They were OK, nothing to compare them to.

I feel they were fine.

Fine.

At the time we were in one of the newest buildings so they were very good.

At the time they were great, My associates degree was very valuable in getting started in the tooling field.

When I went it was hard to get on a computer. They were all being used.

Excellent!

Very good setup for learning, but sometimes there was a crowd in the CAD labs.

Ok for the times.

The facilities while I was at Ferris were satisfactory, although more computers being available for design students would have been helpful.

Very adequate.

At the time I attended, the facilities were good with cad just beginning to be taught in design.

Very nice, and as "up with the times" as possible in an ever changing industry.

Progressive.

Great.

5. What trends in the Drafting and Tool Design industry do you see impacting the TDTD program at Ferris in the next 5 years?

The statements to the question ***What trends in the Drafting and Tool Design industry do you see impacting the TDTD program at Ferris in the next 5 years?*** have a significant attribute of the computer. With statements of "boards are history, computers, computers, computers" the future method is easily predicted. With high end applications of CAD, CAM, SLA being a concern for the future workforce as approximately 60% indicated this trend will have an impact on the program. Indicators of ProE, CATIA, and general Solids are stated as future needs of the Ferris Technical Drafting and Tool Design graduate. Knowing rapid changover, tool performance also were indicated as future considerations for the program. Ten respondents made statements similar to; "do no lose track of the fundamentals of good design' indicating the computer will not solve all problems.

The use of solids - surfaces and StereoLithography (SLA)

Focus on cost reduction and reduced lead times for both design and manufacture of tooling.

I hire Mechanical Designers to support my new product development Engineers. I currently target the four year engineering graphics students because I feel they have the greatest potential to succeed long term. The trend seems to be toward computer modelers who can support multiple disciplines as projects move through the process phases.

With the trend toward engineering software such as Pro-E, much of the modeling and documentation once done by Mechanical Designers is now a result of the Engineers modeling.

Versatile modeling specialists with computer skills that will support Industrial design, engineering and then publications graphics will be the trend.

The reduction in wages in the cutter path field. Many of the software suppliers have made such improvements, that less skill is needed to develop cutter paths. I'm sure this trend will alt design.

Don't know.

Ergonomics and safety.

Going direct from CAD programs into estimating programs. Anything related to computers.

Greater computer dependency linked with machinery.

Assembly of attribute solids with Design Environment. More responsibility for Manufacturing Product.

Been out of the field to long to speculate.

Solid Images and Prototype design and build from CAD. Also FEMA, analysis and more quality science.

Competition from other colleges in CADD Design. This is why Ferris must stress the hands on classes such as
1) Machine Tool Labs
2) Welding Labs
3) Plastic Labs.

CAD - complete designs from part design thru production. (Concept, tool design, prototype, assembly, check fixtures, special machines).

CAD to final tool linking. Possibly "Rapid Prototyping".

Product testing using the computer. (Finite Element Analysis - FEA).

I have not been directly involved in TDTD since I graduated.

?

Computers, modems, internet.

See general comments.

Computer Technology, as in CNC Equipment and in CAD Systems having a broad variety. No Standards.

Worldwide Standardization
Metrics
Public Speaking Skills.

Obviously CAD and CADCAM. Concurrent engineering fro reduced product introduction lead times. The continued need for good process knowledge for design for least cost manufacturing. Design for ergonomics etc. Plastics. Casting/Molding and Stamping "Near Net Shape" and general material reduction in design.

No one (company) draws on the board anymore. I don't think this part of the program should be dropped, but more attention should be focused on the CAD.

More of the computing industry access of different programs.

Solid modeling
Internet

Datamanagement (PDM's)
Visualization- Photo realistic

Drawing and designing thru the world wide web and the internet. Global communication.

CAD. Unigraphics/AutoCAD/Mentor Graphics.

The same as us - Teaching of High End CAD (Pro-E Solids Modeling). Also I don't see use eliminating Our Drafting Classes, which include Descriptive Geometry, Jig and Fixture, Die Design, Working drawings - assemblies and detailing, GDT and Manufacturing Processes (machine shop).

The use of CAD Data over prints to make tooling.
Stay close to the basics of Drafting Standards. I see too many "CAD Operators" that can swiftly create CAD drawings that adhere to no drafting STDS.!
Most work is done on the CAD systems, don't lose sight of the fact that sketching and some drawing ability is still necessary.

Strengths needs to be in CAM, CAD. Knowledge in machinery selection, tool vendor capability (I.E. Don't make your tool vendor manufacture the impossible). Estimating a plus.

Computers, faster and bigger, they are impossible to keep up with.

There is ample opportunity in terms of workload in design, 50+ hours a week are common. Job security is a given now and in the future. Knowing CAD/CAM is fundamental to the job, but knowing what is required in a design requires experience, teamwork, and initiative.

Comparing downsizing engineering departments.

?

Virtual Reality

More attention paid to detailing of DCES, which increases designing time. And more designs on CAD being directly used in the CNC Machining Areas for building dies.

CAD/CAM

Even though my job relates closely to Design I've been out of the Design part so long its hard to comment on the Tool Design industry accurately, however our Tool Design Dept. Works almost strictly with Pro-E software and rarely use the Board.

Computers, Internet and Intranets, Workgroup collaboration will all make the product design, tool design and manufacturing processes more tightly integrated. JIT will require tool designs that minimize setups.

Why 5 yrs? Are there enough young people entering the field to be trained in time to replace the designers of today who will be retiring in 5-15 yrs.

I feel Rapid Prototyping may be used more. Quality Control or SPC is widely used and should be stressed in education.

Document Management.

Need a CAD system that is being used by G.M., Ford, or Chrysler, the system I learned CIMLINC was useless for finding a job. (CATIA, P.D.G.S., Unigraphics)

Of course more use of computers like CATIA and Intergraph, more use of 3D modeling as it becomes easier to do, will be used soon to model the total manufacturing process. Computer are being used more for conveyor system flows, timing and bottlenecks. CAD/CAM/CAE and Window 3.1 or 95 (A Must). You must keep the drafting going (12 hrs) at least if they go on for a degree; the drafting will do them good.
I am in the Aluminum Industry and I see innovative tools such as abrasive water jet, hydroforming, and simulforming.

Board work is history. Computer design is a must. I'm in sales working with people and deal with people (customers) who rely solely on CAD-CAM systems.

Continue Heavy On CAD

Solids Modeling.

CAD - 3D Surfacing- Solids - Mold Flow - Virtual Reality Designing.

I don't have info. to evaluate.

CAD/CAM
?I fee the role of Drafter going away as Engineering Designers use advanced CAD (like unigraphs) to do what is needed to get production out the door. My company is moving this direction.

The continuing trends towards the "electronic" drawing board.
The need for state of the art computer facilities and instruction.

Solids modeling because even your smaller companies are moving to solids.

The need to develop a 4 year program in this field.

GD&T, Parametrics, but don't forget basic's of tolerancing & general drafting.

Technology advancements in computer sciences, CAD, 90+% of all product; Machine Die's and Design being done on CAD.

Computers

Advancements in computer technology. 3D modeling & animation of tooling and fixtures.

Not close enough to it today to say.

CAD/CAM/CIM/FEA/CIM Fully integrated 3D software rapid prototyping.

"Plastics" & tooling for plastics.

The title should be changed to a design degree in tech drafting. 2 year, 4 year, Masters. The trend in industry is hiring temporary contract engineers (job shoppers) vs. Full time permanent. Having been a contractor for 10 years, I prefer it to permanent since the opportunities and $$, and variety are greatly enhanced. However, they only hire experienced people for contracting (as a general rule). New graduates would still have to seek entry level positions.

Computers.

Computers! Computers! Computers! In addition to core design/drafting skills there is the need for relating CAD to MRP and shop machines - Designers must be able to relate with Manufacturing Process, capability and B/M structure.

Computers!
The "hands on" experience is being removed by computers, iges, screen dumps, math data, e-mails, people won' be interacting with the real world of what it take to build the "widget".

Virtual Reality?

CAD

CAD
GD&T

3D solids, surfacing and tool pathing. Rapid Prototyping is hot now. So are 3D video moldflow/moldcooling packages.

More computers being used.

CAD Design of Dies & Tolls in both 2D and 3D solids.
Strong emphasis on designing & thinking of how tools work and why.

I do not work in the tool design field.

Trying to keep up with software & technology.

Boards will be gone!
More computer aided machine & prototyping processes like SLA.

Have seen CAD operators which are proficient with software but lack understanding of sound Design & Drafting principles i.e. Can it be MFG economically do not understand orthographic projection, dimensioning & geometric tolerancing.

Must have 4 year degree to compete in industry.

CAD, CAD, CAD! Solid Modeling.

FEA, Rapids Prototyping, Solid Modeling.

Computer technology is changing so fast, try to keep up as much as possible.

3D modeling as well as related computer skills such as spread sheet and word processing these are very necessary in todays market.

3-D CAD

CAD - Animation

Full blown solid modeling I.E. unigraphics, pro-e, ideas etc.

The trend is toward CAD for CAM purposes, but the basic fundamentals at the board should still be taught. Many companies have their designing and detailing done on the outside.

Very few designs are being done on the board - the trend is moving toward CAD, almost 100%.

Have not been associated with drafting for many years and thus am not able to comment.

Computer Technology, Rapid Prototyping.

CAD, Pro-E right know we cannot find enough Pro-E.

More GD&T, Look and Prints from Japan if you haven't already. They're hard to decifer.

CAD
Modular machine design- using standard components that are able to be altered for specific parts. Not designing from ground up.

Unigraphics system used throughout big 3 automakers and suppliers.

CAD, CAD, and more CAD. But you must remember to teach the fundamentals of "Good Design". CAD is just a tool not an excuse for a person to call themselves a Designer. Also more hands on. My brother Charlie Prahl came through FSC Machine Tool. The designers must get hands on experience to learn about go design. Good Design is only good if it can be built effectively. We have shown each other how important both functions are. A good designer is aware of the little things that make a good design by making the tool as robust and manufaturable as possible. This is where the rubber meets the road. FSC provided the foundation upon which I have built my career. I can't ask for more than that. After we leave, its up to us to make it go. Thank you Ferris State.

There will always be a need for people w/ hands on training, but you must move and keep up w/ technology.
Solids based CADD systems, but still out putting an intelligent, detailed drawing which follows traditional drafting communication guidelines.

Trying to keep up with the latest technology.

Most businesses are using Auto CAD. Even though new software is being introduced many businesses require disk file copies of designs in AutoCAD. Students need time using CAD to produce designs and details in both 2 and 3D.

GD&T Dimensioning.

CAD the master - greater links throughout product development.

Internet options, strong solids background.

Rapid Prototyping
CNC machine Programming - EDM - Etc.

Solid modeling of parts.

Development done in teams.

CAD

Technology is developing so rapidly, the need is to keep abreast, but do not sacrifice the fundamentals that make the trade what is - don't lose focus on core mat'l.

Product Engineering and manufacturing engineering people working much closer.

3D Solid Modeling.

99% CAD based, IGES filing, more stress on CAD/CAM. Fixtures for assembly work.

More floor, machine, like experience. CAD of course. Give your designers some hands on, touch the tools, type of work. Maybe with some local industries.

More 3D modeling and surfacing. Rapid Prototyping knowledge.

3-D CAD design = Jigs, Fixtures, Dies, Molds.

Use of coating on tools. Automated electronically controlled assembly lines. I would recommend some electronic courses.

When I attended the computers were very old, outdated, and crashed a lot. As Auto makers are demanding faster turnaround time for both products and prototype tools, hardware and software will need to evolve. We are now looking at software that will scan your 3D wireframe of a mold and add injection box, build-up, and stock list design Automatically. Some other possibilities are 3D solid modeling, draft analysis, and 5 axis machining.
Technology

Solid Modeling etc.

Designing injection molds with solids and having designers be more knowledgeable of the tools they design. Also alot more knowledge of the PROCESS the tool is for.

Change has taken place away from metal working to plastics. This will continue.

More use of non-metallic materials 3-D modeling on unigraphics computers, computers, computers.

Solid Modeling and Computer Rendering

Use of the different CAD systems.

Combined designing and programming.

Trends toward further tool performance production (computer based)

Further trends toward rapid changeover concepts to better manage setups/changeovers.

No comments as I'm not in the tool and die design industry at present.

Computer/design

I am no longer in this field and I cannot make a good judgment on this, but I would guess that computer-based solid modeling coordination's with computer programmed tooling machines is where the industry is heading.

Solid modeling, tooling methods other than CNC cutting steel. Casting from rapid prototype models, RTV molding. There are alot of unconventional tooling methods being used in industry today to help speed time to market and they should be covered.

Everything is CAD at Prince few dimensions and more emphasis on CAM.

Increased use of CAD Solid design, etc.

All most everything will be CAD/CAM and Ferris will need to make sure they have the equipment for this.

Understand what type of steels to use in dies and molds, taking into account size, tool life, material to run, process temp/variance in cycle, etc.
Ceramic tooling etc.

The ability to enhance existing designs (must) to a better one.
Being able to utilize multiple programs CATA, PDGS, Pro-E. Because it seemed to be automotive driven. I think the industry will need better tool designers/prod. Designers. If we could have understood product design it could aid in the tool design and how they interact. This seems to be a critical link that industry is missing.

I'm not in that fields of expertise, but I would hope your computer CAD CAM budget is large.

Computers

We have been designing more tooling to be quick change. Our trend is toward shorter manufacturing runs but varied part sizes on certain equipment with the emphasis on the least amount of idle machine time.

3D assembly and Detailing from starting concept to end of program.

Solids

Don't loose sight of the drawing board itself. Lettering by hand and hand sketches are still important.

3-D is rapidly becoming a necessity and the integration of CAD/CAM required for the US domination in the world manufacturing base.

Programs which will complete mold layouts.

If it hasn't already, the total use of computers in the design, detailing, and analysis of your task at hand.

Heavy emphasis on 3D modeling

Quality, New Materials, CAD

As an educator for the past 23 years I have implemented several of the Ferris type programs etc into high school as well as college (Baker-courses) where I teach all advanced tool-die design-mold/diecast design as well as autocad.

There are few good die designers in the industry today. There seems to be a 10-15 year gap of education it this area. There are a lot of good CAD operators but not too many of them know how to Design Dies.
The product design area is lacking the education in the area of what can be done with metal stampings. Example: Metal can't flow around SQ. Corners but the continue to design parts that way. Product Designers should spend a min. Of six months in the stamping plant before they start designing any products.
G.D.T. is another area that is lacking in education. G.D.T. is used a lot in the automotive field & there are very few engineers that understand how it is used.
Engineers in the stamping industry spend a lot of time up front engineering. If the areas of Die Design, Product Design, & GDT were used & performed better a lot of the up front engineering time would be reduced. This not only would reduce the cost of a product but would reduce the time that it would take to get it into production.
I hope these comments help your future plans in the TDTD program.

I have always been appreciative of the educational opportunities made available to me at Ferris State College. (It was not a University at that time.)

One area that I wasn't prepared for was the expectation or heavy hours in the machine tool field. I was expecting 9-5 M-F and found 55-60 hors/week minimum. Maybe more prep in the actual job experience would be good.

Extremely, glad to here FSU added the Quality Engineering Technology Program if was available in 91 would have chosen as BS progrm, at time Prod. Oper. MGMT was closest match.

Ferris gave me the right tools to be a success in the technical world. I got the basics and foundation necessary to learn and build a career in the world of degreed personnel.

Manual "board" drafting is virtually extinct. Even 2D CAD drafting is less important than 3D. We seldom get a 2D paper part print from a customer, just a 3D model. Solids modeling is the way to go. Unigraphics is a powerful package. The computer age has changed the world completely since I attended Ferris in 1982-84. Don't ignore technology.

The colleges DO NOT prepare any students fro what the real working world is like. I had no idea what it was like to go into industry right from school and have to perform to keep my job!

At present we do all our design on 2D CADAM. We have not been able to justify the cost and time of 3D for dies. Our biggest problem is finding anyone with die design experience or training in larger dies and processing. Too many people can run the CAD systems but do not know how to apply it to work. (Tool and Die design 1st CAD Later)

I had a good educational at Ferris I think my daughter did also - she just was offered her first job after she graduates in May from Manufacturing Engineering.

Very good stepping stone to a bachelors program.

I have always felt that my educational experiences @ FSU where invaluable as my career in Manufacturing Engineering has progressed.

Excellent program which got me started in the workplace and helped me develop to executive level management. If I can help more feel free to contact me.

I think I gained a career start at Ferris. In today's field skilled drafters in specific areas are hard to find.

I felt that I left the program ready to perform a job. My first few jobs after Ferris required that. I'm glad that I was able to step right in and do a job with a minimum of additional training.

Keep the instructors who give a damn about the students, get rid of the rest! I had a couple of real good ones at Ferris, and I'm thankful for them to this day!

In the survey CAD was mentioned several times. My nephew graduated from this same program in 1996 but had no formal CAD training. CAD training is a must in today's market. Every step should be taken to ensure that every student have at least 4 weeks of hands-on experience to give them an edge!
FSC provided the foundation upon which I have built my career. I can't ask for more than that. After we leave, its up to us to make it go. Thank you Ferris State.

Machine shop labs are not necessary in practice, only in theory.

It would be nice if you could compile a list of students, by year, of their current employers to stay in contact with each other.
IMPOSSIBLE TO GET A B.S. THRU THE LIFELONG LEARNING CENTER - NEED CORE CLASSES ARE OFFERED DURING THE DAY WHEN OLDER RETURNING STUDENTS WORK FULL TIME, DURING THE DAY. ALL MY COMMENTS IN THIS AREA CONTINUE TO FALL ON DEAF EARS. I'M GOING TO BAKER - HAVE TO!!!!!

CADD is changing how we do our work. But, our work is still Design and Drafting. If students are weak in Design and Drafting skills, they can't overcome their weaknesses by being better CADD operators. These are separate skills! Design & Drafting is #1 and CADD #2 in importance to a successful career.

I hope to re-visit Ferris sometime and see the place after all theses years. It would help with the above question.
I have been in Supervision for 7 yrs, & when I have hired new people I always watch for person with a Ferris background.

It's been so long since I attended most of the questions don't apply to me and I can't answer the above as I don't recall half my classes. Sorry.

Overall, TDTD at Ferris is a solid program
I'm proud of my degree and it has helped me get to where I am today.

Teaching descriptive geometry on the board. It is a general consensus of the people I work with that is the best way to learn proper projection.

At my time at Ferris the computer courses taken & equipment were out of date within 2 years.

Keep up the good work!

Good Survey.

Thank you for asking

Excellent reparation for industry! I needed to give job experience in order to teach architecture! I am glad I went to Ferris it has help me in my career of Design I have 25 years now. I have strong feelings about this you may want to call me @1-810-576-0866 to discuss.

I have noticed that managements at most companies view tool engineers as a necessary evil. Sometimes even un-necessary! They see us as evil overhead that produces no products. This is largely due to the overwhelming ignorance of the management. Because of this, they downsize or eliminate tool engineering staff in favor of contractors or subcontracting outside.

A 2yr program as opposed to a 4yr program limits your ability to advance.

After 14 1/2 yrs in the Mechanical Engineering field, I became self employed in a completely different field and remained there until my recent retirement.

I believe when I started working that I had a very good understanding of the basics of Drafting and Design. What I am seeing is a very fast rise in technology. CAD is going from simple wireframe to surfacing to solid modeling and now to hybrid modeling and tooling is evolving from knee mills to CNC code programming to completely automated machining. Plus the prototype or Rapid Tooling methods. Somehow Ferris is going to have to teach all the basics and the new technology.

TDTD gave me a great start.

I have worked as a designer, product, mold and fixtures, as and engineer and now in quality. Ferris did a good job in a overall education. So that I was able to do this.

Better understanding of overall industries. Especially Automotive. Terminology, what happens in a program, understand time involved to do things.
An internship would be a good requirement.

FSU gave All of Us the tools to be good draftsmen/designers, but only a few know how to utilize their resources to be GREAT Designers. I wish we could have designed 2+ dies and molds under pressure to feel what industry is doing also.

Ferris State gave me the opportunity to mature, understand life on your own, and then take courses that allowed me to grow.

I've trained many entry level draftsmen and find that haven't had the training in dimensioning practices, fasteners, standard components and fitting practices which I feel I received at Ferris.

Change all degrees to read/include the word Engineer, it will increase hire rate and starting salaries greatly. G.M. only employs engineers.

Teach more job ethics ~ workers must respect co-workers & company they work for.

I was unfortunate to be caught in the Trade Tech Teaching Program when it was going away from general ed courses being non "college" transferable credits. When I went back to look at my 4 year degree as you were setting up more ways to come out of a TT with a bachelors I came to find that it was being organized by someone who didn't know what they were doing. Counselors couldn't tell me what I needed nor how to get it. All the brochures and course "claims" were published but yet the counselors didn't know much about it. It to me looked like "False Advertising". It seemed like an invitation to come, give us your money, then we will figure out what to do with you.

It's been 30 years.

GET RID OF TODD ROSE
It's too bad, after 4 years, that it still upsets me of what I missed out that 1 term I had with Todd.

Cross Functional Teams Working On Projects Would Reflect Real Life Much Better.

My time at Ferris was spent before computers were used in the trade. The type of "Manual" Training I received has served as a solid foundation for helping to best utilize the developing technologies associated with current engineering methods. Manual drafting is a thing of the past, but "making drawings" is not.

Ferris was a great place and still is!!

The dress code was helpful - A tie wasn't all that bad

1. Due to ISO and QS9000 requirements moldflow/cool analysis will be a necessity.
2. Update computer systems to those used by tool vendors/and BI63 FORD=PDGS Others=Pro-E, CADKEY etc.
3. Stereo Lithography for prototyping otherwise a thorough intro to tool design.

My career went to management of tech people. But Ferris got my foot into a door of an aerospace firm. Gave me the knowledge of tooling and technical skills needed to deal with technical people.

I appreciate your need for the requested information, however, I left Ferris in March of 1965 and answering these questions would probably just confuse your survey.

Going to Ferris for TDTD was one of <u>the</u> most positive experiences of my life - Anyone who is considering a hands-on engineering degree should investigate Ferris' TDTD.
I would be willing to come to Big Rapids and talk with the TDTD classes.

The coarse provide a very good foundation for my career even though I moved away from Drafting and Tool Design. I have held very good management possion's which required technical capabilities.

Would like to see an Open House some weekend to see/hear about TDTD.
Feel free to contact me @ 810-236-2161 (8 - 5) 810-629-8416 (after 6pm) Ken Weigle.

When I was going to FSU there were no CAD classes and only one computer class.

Provide less emphasis on computer based programs and teach the foundation building basics, students today need to have the ability to analyze what the computer tells them, rather than just accepting it as fact. In short throw out the damn computers and get back to the basics!

Sorry, didn't have time for more detailed answers.

Strong program and strong support add more to the strength of materials and more to tool material selection. Reduce drafting board time and emphasize more CAD and CAM.

The money I spent at Ferris for my education was money well spent and is a good career choice in terms of money made, and the work environment. Learning is lifelong so starting at Ferris for me was a sound choice.

Overall the TD/TD program gave a good overall understanding of tool design, but nothing still compares to knowledge gained on the job.

I have always put FSU in the minds of my students and have had several of my graduates attend Ferris. It has been a long time since I've seen what the program consists of. The program has a good broad variety of subjects. You never know what you will end up doing or what you will like until you try it all.

Even though a lot of drafting is not done on the board, the basics should still be taught. I know someday drafting boards won't be used, but a least for the next 5 years they should.

The first "CAD" drawing I saw was a Boeing 747.

Board Drafting is a thin of the past in the Detroit area. CAD experience a must, surfacing, solids... Detailing parts is quickly fading away because of the CAD data.

The TDTD has always been the best in the state: Keep up the good work.

Simulforming is a process where multiple pieces of flat stock are formed and self-riveted simultaneously. Gary, I was in the class with Brent Immink, Bob Decker, Brian Markin, and Chris Kulka. If Ray Cross is still with FSU, Give him my regards.

UPGRADE COURSES TO BE TRANSFERABLE TO OTHER UNIVERSITIES ALLOWING STUDENTS TO PURSUE ADVANCED DEGREES WITHOUT REPEATING ALL COURSE WORK DONE AT FERRIS. ALTHOUGH FERRIS IS AN EXCELLENT SCHOOL, IT IS VIEWED AS A TECHNICAL SCHOOL ONLY. WHILE TEACHING THE SAME MATERIAL, COURSES COULD BE UPGRADED TO MEET TRANSFER REQUIREMENTS FOR UNIVERSITIES OFFERING SIMILAR COURSES IN THEIR BACHELOR'S, MASTERS AND DOCTORAL PROGRAMS GIVING FERRIS STUDENTS AN INCREASED COMPETITIVE EDGE AND SAVING THEM BOTH TIME AND MONEY IN THE LONG RUN. I WOULD RECOMMEND THAT FERRIS START A LONG TERM (SHORT IF POSSIBLE) GOAL OF MEETING THE TRANSFER REQUIREMENTS OF THE TOP 10 RATED ENG'G. UNIVERSITIES IN THE NATION.

I enjoyed my time a Ferris and Am thankful they prepared me well for the real world!

If you ever have the opportunity to tour Walker Tool and Die, jump on it. They are a world class die shop with a laser machine, 8 EDM's and a 1000 ton press. They build a excellent tool.

Walker Tool & Die
2411 Walker Rd NW
Grand Rapids 49504
Bob Borgeld (616)453-5471

Was really prepared for a job in industry after college. Even though it was really tough I now see the benefits.

I can't properly answer the last three questions because I haven't been back to Ferris in over 20 years. I feel that in 1975 I received the best education for this field of work that was available. I have heard second hand of changes in the curriculum and updates and am confident Ferris is probably at or above the level of current technology. My education there in my career path has proven invaluable.

From what I have seen I other graduating students (not from Ferris necessarily for I know none) but emphasis on CAD is too great and emphasis on drafting skills is too little. To draft on a computer you still need good drafting skills.
During my first year in Drafting with Mr. Rose I noticed students without Drafting experience couldn't keep up and had to quit or drop out. This was unfair I also received "B" grades when the rest of my college I received "A"s. I wasn't the only one in my class noticing this.

An important aspect of any program and college is its reputation. During my time in the program I felt that the instructors and associated course work did a good job of eliminating poor performers. In recent years it appears more and more schools are tolerant of poor performance in order to graduate greater numbers of students.

Students need to understand tolerancing & basic tool room machining processes, and basic dimensioning.

I went through the welding program. I have the associate degree. It had to be in the 1970's. a lot of the classes you have listed weren't available when I was there, or, the ones listed some I never took. Which I could be of more help.

I feel my time at Ferris was well spent and was an excellent preparation for TDTD industry.

The TDTD Program Not Only Prepared Me For The Real World But The Instructors Were Of The Highest Caliber. Keep Up The Good Work!

We have done many following of our graduates and keep a good handle for Job Placement for graduates as well as for past graduates. Our questionnaire is 1 page. Hope you collect a good database.

Keep up the good work! P.S. say Hi to Gary Ovans if he's still around!

*6. **Please add any general comments.***

The comments to ***Please add any general comments.*** were basically all positive in nature. Many comments were similar to: "*I have always appreciated the opportunity that Ferris has given me. It is difficult for me to imagine what my life would have been like without a degree from Ferris.*" and "*Going to Ferris for TDTD was one of the most positive experiences of my life - Anyone who is considering a hands-on engineering degree should investigate Ferris' TDTD. I would be willing to come to Big Rapids and talk with the TDTD classes.*" . Two negative comments unrelated to the program were from the College of Education, and Gerholz LLL. Similar to the Future Trends Question #5 many inferences to advanced CAD applications were stated again.

I have always appreciated the opportunity that Ferris has given me. It is difficult for me to imagine what my life would have been like without a degree from Ferris.

The TDTD program was a good base to begin a career in design - However, actual on the job training with individual companies proved to be a quicker teacher of exact methods used. A more in-depth look at the design phase would have taken the next step to prepare students for employment.

I would like to hear the results of your survey.

Most of my drafting was in the chemical area; pipe, tanks, pumps, etc. Didn't answer questions concerning CADD since I'm 1970 vintage. I stopped working in 1987 due to poor health.

Don't forget the basics : good writing and reading skills as well as math. Also, application of what is learned.

I'm graduating w/ B.S. 1997, eleven years after my associate degree.

I felt I was very well prepared. I spent 5 years in machine design prior to obtaining a degree in education. The past twenty years I have been teaching mostly industrial education classes in graphic arts and photography.

Anybody and any college can teach Computer Aided Drafting. The key is having somebody that knows how to make what he is drawing. This will set Ferris State College apart from the other colleges. This will make the Ferris State College graduate hit ground running vs another colleges graduate.

Ferris has always been on top in the technology field. Instructors knowledge is key to learning the correct way.

I think for an AAS degree you need to stick w/ the basics to get a good foundation to build upon.

Section 3 Employer Follow-up Survey
Contents

FERRIS STATE UNIVERSITY

March 7, 1997

Technical Drafting / Tool Design Program Industrial Employer Survey

The Technical Drafting/Tool Design program at Ferris is accredited by the North Central Association . The recent NCA site visit team mandated that Ferris develop a program review process for all academic programs at the University.

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 goal of program review is to insure that the academic programs of the University achieve and maintain the highest possible standards of academic excellence. 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 1996/97 academic year, the Technical Drafting/Tool Design 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 survey sheet with your written responses in the addressed stamped envelope by April 18, 1997. The survey should only take a few moments to complete. Individual responses are confidential but the overall responses will be analyzed to help determine the status, trend, and future of the TDTD program at Ferris.

Your participation in this survey is critical in order for us to get an accurate review of our program. On behalf of the current and future students, the faculty of the TDTD program thank you in advance for your time and input.

Sincerely,

Mark Hill, Professor
TDTD

Rick Eldridge, Assistant Professor
TDTD

Gary Bradt, Assistant Professor
TDTD

Todd Rose, Assistant Professor
TDTD

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DESIGN, MANUFACTURING, AND GRAPHIC ARTS
COLLEGE OF TECHNOLOGY
915 Campus Drive, Swan 109, Big Rapids, MI 49307-2291
Phone 616 592-2511 Fax 616 592-2407

Ferris State University
Technical Drafting / Tool Design
Survey

Please answer the following questions by either writing you answer in the space provided or by circling the number for the most appropriate answer.

I. The number of employees in your company is:

1. 0-50 2. 50-100 3. 100-500 4. above 500

II. Your primary manufacturing process is:

1. Molded plastics
2. Metal stamping
3. Tool building
4. Other (please specify_____

III. How many tool designers does your company employ?_____

IV. Does your company build tools in-house or contract tools to be built outside?

1. In-house 2. Outside 3. Both

V. What percent of your companies tools do you design in-house and what percent do you contract for outside design?

1. % in-house_____ 2. % outside_____ (total 100%)

VI. What types of tools are used by your company? (circle all that apply)

1. Injection molds
2. Compression molds
3. Blow molds
4. Vacuum forming
5. Extrusions
6. Special Machines
7. Gages
8. Other tools
   specify_____
9. Progressive dies
10. Draw dies
11. Compound dies
12. Transfer dies
13. Fixtures
14. Multi slides / 4 slide
15. Die casting
16 Other casting processes
   specify_____

VII. What salary range would you start a 2-year associate degree tool designer (include overtime)?

1. $10,000 - $15,000
2. $15,000 - $20,000
3. $20,000 - $25,000
4. $25,000 - $30,000
5. $30,000 - $35,000
6. More than $35,000

VIII. What percentage of the total designs are created on CAD verses the board?

% CAD_____ % Board_____ (total 100%)

IX. What percentage of your CAD tool designs are generally 2 dimensional or 3 dimensional fully surfaced models?

% 2 Dimensional_____ % 3 Dimensional_____

X. Please rate the relevance of the subject areas of study in the Technical Drafting & Tool Design program to your work. This will help us rate our present program as well as possible future revisions necessary to stay up-to-date with current and future graduates.

	Very Important	Important	Not Important
Fundamentals of Drafting	☺	😐	☹
Introduction to CAD	☺	😐	☹
Descriptive Geometry	☺	😐	☹
Product Detailing	☺	😐	☹
Computer Aided Drafting	☺	😐	☹
Computer Aided Tool Design	☺	😐	☹
Die Design	☺	😐	☹
Mold Design	☺	😐	☹
Basic Machine Tools	☺	😐	☹
Advanced Machine Tools w/CAM	☺	😐	☹

	Very Important	Important	Not Important
Physics	☺	😐	☹
Introduction to Materials	☺	😐	☹
Geometric Dimensioning & Tolerancing	☺	😐	☹
Product Assemblies & Detailing	☺	😐	☹
Moldflow	☺	😐	☹
CAE	☺	😐	☹

XI. Please circle the number that indicates the level of importance the following tool design skills are for a qualified tool designer:

	Very Important		Important		Not Important
1. Board drafting	5	4	3	2	1
2. Descriptive geometry	5	4	3	2	1
3. CAD 2-D	5	4	3	2	1
4. CAD 3-D modeling	5	4	3	2	1
5. CAD surfacing/solid modeling	5	4	3	2	1
6. Geometric dimensioning & tolerancing (GD&T)	5	4	3	2	1
7. Product design/detailing	5	4	3	2	1
8. Gage design	5	4	3	2	1
9. Jig & fixture design	5	4	3	2	1
10. Die design - traditional	5	4	3	2	1
11. Dies design - CAD	5	4	3	2	1
12. Mold design - traditional	5	4	3	2	1
13. Mold design - CAD	5	4	3	2	1
14. Special machine design	5	4	3	2	1
15. Automation and system design	5	4	3	2	1
16. Materials and material selection	5	4	3	2	1
17. Moldflow	5	4	3	2	1
18. Physics	5	4	3	2	1
19. Static and strength of materials	5	4	3	2	1
20. Computer aided FEM/FEA	5	4	3	2	1
21. Kinematics	5	4	3	2	1
22. Fluids (hydraulics,pneumatics)	5	4	3	2	1
23. Rapid prototyping for temporary tooling	5	4	3	2	1
24. Electronic and electrical sensors for tooling	5	4	3	2	1
25. Manufacturing processes	5	4	3	2	1

26. Welding & metal joining processes	5	4	3	2	1
27. Machine tool fundamentals	5	4	3	2	1
28. Advanced machine tool with CAM	5	4	3	2	1
29. Die & mold construction and repair	5	4	3	2	1
30. Quality control and SPC	5	4	3	2	1
31. Design for manufacturing	5	4	3	2	1
32. Process planning and estimating	5	4	3	2	1
33. Body design	5	4	3	2	1
34. Metrology	5	4	3	2	1
35. Internship for tool design	5	4	3	2	1
36. CIM (computer integrated mfg)	5	4	3	2	1
37. CAD macro creating/system customization	5	4	3	2	1
38. Robotics	5	4	3	2	1
39. Tool tryout and processing	5	4	3	2	1
40. Computer applications (spreadsheet, word processing, data base, data transfer)	5	4	3	2	1

XII. Please provide any additional comments you feel would be important to improving our present program.

XIII. Quality of Ferris TDTD graduates 5 4 3 2 1

XIV. Would you like summary of the results of this survey?

1. Yes_____ 2. No_____

Name:

Address:

Thank you for your assistance.

Summary: TDTD Industry Survey

Introduction

This section of the Program Review Report summaries the results of the Technical Drafting and Tool Design Employer survey conducted April 1997. The information received by employers shows that our Technical Drafting and Tool Design graduates are providing industry with the type of skilled employee they are looking for. The survey also shows that we are providing graduates with and education that trains them to go into varied segments of engineering such as: product design, tool design, gage design, die design, mold design and machine design. The results from employers indicate we are providing the solid foundation companies need for highly skilled employees to run today's sophisticated manufacturing environment. The survey was mailed to 466 employers. Approximately 100 were returned for insufficient addresses. Of the 366 remaining, 101 surveys were received for analysis which creates a return rate of 27.60 percent.

I. Number of employees in your company?

1. (0-50) 19% 2. (50-100) 13% 3. (100-500) 43% 4. (above 500) 26%

II. Your primary manufacturing process?

1. Molded plastics	11%
2. Metal stamping	27%
3. Tool building	24%
4. Other manufacturing	39%

III. How many tool designers does your company employ?

The average was 9.7 but this is a little miss leading because several companies may have 100 designers because they are strictly a design house with no manufacturing and others have zero or very few designers because they have their designs farmed out to design houses. The project leader who works with design services must have a thought knowledge of tool design in order to get the properly designed tools for there company. Many former graduates from the Technical Drafting and Tool Design program advance to these vital positions because of there education and experience.

IV. Does your company build tools in-house or contract tools to be built outside?

In-house 28% Outside 28% Both 44%

V. What percent of your companies tools are designed in-house and what percent do you contract for outside design?

Percent in-house 54.7%

Percent outside 45.3%

VI. What types of tools are used by your company?

Injection molds	30%
Compression molds	6%
Blow molds	3%
Vacuum forming	7%
Extrusions	52%
Special machines	52%
Gages	65%
Other tools	19%
Progressive dies	46%
Draw dies	38%
Compound dies	31%
Transfer dies	34%
Jigs/Fixtures	62%
Multi slides / 4 slide	8%
Die casting	7%
Other casting	8%

V. What salary range would you start a 2-year associate degree tool designer?

$10,000-$15,000	2%
$15,000-$20,000	15%
$20,000-$25,000	31%
$25,000-$30,000	28%
$30,000-$35,000	16%
More than 35,000	4%

VIII. What percentage of the total designs are created on CAD verses the board?

CAD 91.1% Board 8.9%

IX. What percentage of your CAD tool designs are 2 dimensional or 3 dimensional fully surfaced models?

% 2 Dimensional 70.3% % 3 Dimensional 29.7%

X. Please rate the relevance of the subject areas of study in the Technical Drafting & Tool Design program to your work. This will help us rate our present program as well as possible future revisions necessary to stay up-to-date with current and future graduates

(Very important = 3 Important = 2 Not important = 1)

Fundamentals of Drafting	2.7
Introduction to CAD	2.7
Descriptive geometry	2.5
Product detailing	2.3
Computer Aided drafting	2.7

Computer Aided tool design	2.6
Die design	2.1
Mold design	1.6
Basic machine tools	2.2
Advanced machine tools w/ CAM	2.1
Physics	2.1
Introduction to materials	2.4
Geometric dimensioning & tolerancing	2.7
Product assemblies & detailing	2.4
Moldflow	1.4
Computer Aided Engineering CAE	1.7

XI. Indicate the level of importance the following tool design skills are for a qualified tool designer.

(Very important = 5 to Not important = 1)

Board drafting	2.9
Descriptive geometry	3.8
CAD 2-D	4.1
CAD 3-D	3.8
CAD surfacing and solid modeling	3.5
Geometric dimensioning & tolerancing GD&T	4.0
Product design and detailing	3.5
Gage design	3.4
Jig and Fixture design	3.5

Die design - traditional	3.0
Die design - CAD	3.5
Mold design - traditional	2.3
Mold design - CAD	2.6
Special machine design	3.1
Automation and systems design	3.1
Materials and material selection	3.8
Moldflow	2.1
Physics	3.2
Static and strength of material	3.4
Computer Aided FEM/FEA	3.0
Kinematics	2.9
Fluids (hydraulics/pneumatics)	2.9
Rapid prototyping for temporary tooling	2.9
Electronics and electrical sensors	3.2
Manufacturing processes	4.0
Welding & metal joining processes	3.3
Machine tool fundamentals	3.8
Advanced machine tool with CAM	3.3
Die and mold construction and repair	3.0
Quality control and SPC	3.5
Design for manufacturing	3.9
Process planning and estimating	3.1

Body design	2.2
Metrology	2.9
Internship for tool design	3.6
CIM (computer integrated mfg.)	2.7
CAD macro creating/system customization	2.8
Robotics	2.6
Tool tryout and processing	3.5
Computer applications (spreadsheets, word processing, data base/transfer)	3.6

XIII. Quality of Ferris TDTD graduates? 4.1

TDTD Industry Survey Comments

XII. Please provide any additional comments you feel would be important to improving our present program.

Public Speaking Skills
Basic Knowledge (or more) of what is inside a computer
Unix language

See previous comment @ X.

Use software that is more standard to industry would make it easier to land first job. Such as CADKEY or AutoCAD.

Have in the past hired 2 Ferris Grad, both Excellent, BUT both schooled in Die Construction and Design Methods that have not been used in 30 years.

Most college graduates lack practical experience. Co-op programs should be a part of every engineers education.

All of these candidates need much more then the CAD tools.

Person should have a common knowledge of machine shop machines, (grinders, lathe, mills, and drills) so they know what the machinists will need to complete the design.

Exposure to actual manufacturing processes that tooling is designed for would be helpful.

Many larger corporations are 'out-sourcing" design work. I assume you get feedback from these businesses providing these services (example - Rapid Design Service).

A mandatory Internship would be a big help. Actually; working on a shop floor in a manufacturing plant or a tool shop would be a bigger help than working on a CAD tube or a drafting board.

We are just beginning to become familiar with your program. Our intent is to plan a visit in the near future. We have heard great things about your students!

We often hire Tool Designers and convert them to Product Designers.

We use CADKEY - going to 3D Tool Design and integrated CAM for CNC Machining. Sensors (electronic) used in all tools. Investigating assembly and molding dies.

Stress mathematics is important. Trig.

Could you please add hands on training workshops (to design detail) then (machine and assemble). Complete start to finish.

Individual must have mechanical aptitude in addition to CAD and Design Skills.

Tool Designers are not normally needed at our facility because my plant is strictly an out assembly plant and received prints from another company Ford or Mazda. Some of our skilled trades persons may seek and associate degree after their apprenticeship.

Geometric dimensioning and tolerancing very very important.

How do we get these young people integrated into our industry/business w/o over burdening the company while they become productive.?

Western Michigan is growing more machinery builders whose needs are for more machine design knowledge instead of product design knowledge. Giving you students a good background in both areas will make them more marketable. Also teach them the importance of simple details - like correct spelling on resumes.

The present education system turns out people who can't think on their feet and need something other than the most powerful tool they have; their brain; to do something. A firm and solid basic math, communication foundation is needed.

All CAD designers should work on manufacturing floor for at least 1 year Assembly - disassembly.

The people available to us with four year and associate degrees have not been developed in Orthographic projection and proper section cuts.

Skills that spin traditional industrial design up and through concept development.

Use of real life situations. Investigate problem, engineed solution, design; detail tools.

Do you have a survey for product designers also?

I'm not familiar with your program. However I feel "hands on" training- working with machines to see how the tooling works - is very beneficial.

It has always been my belief that a good mold designer should have some floor experience.

Students must have training in drawing (drafting) fundamentals. Have an understanding of machines and machine tools. Good communication skills, both written and oral, are very important.

Section 4 Student Evaluation of Instruction
Contents

CURRENT STUDENT SURVEY

1997 PROGRAM REVIEW

TECHNICAL DRAFTING TOOL DESIGN PROGRAM

Please answer all of the following questions truthfully and to the best of your ability. The survey is intended to help us evaluate the program. It is also used by the university to help plan the future needs and direction of the program.

Please check the appropriate box

first year ☐ second year ☐

1. Why did you select the Technical Drafting Design Program at Ferris?
   Please circle the item number/s that best fit you and your decision process.

   1. Friend suggested program

   2. Family suggested program

   3. Teacher suggested program

   4. School counselor

   5. Advertising

   6. Quality and reputation

   7. Other _____

2. What could Ferris State University do to better promote the Technical Drafting Tool Design program?
   Please circle the item number/s you feel would be the most successful.

   1. TV advertising.

   2. Radio advertising.

   3. Video sent to schools.

   4. Visits to schools from a Ferris admission representative.

   5. Technical drafting faculty visits to schools.

   6. Career center or High School field trips to see the TDTD program.

   7. Direct invitation to perspective students to visit the Technical Drafting Tool Design program.

   8. Brochures and materials sent to school counselors.

   9. Other:_____

3. Do you plan on obtaining a four year degree?

YES_____ NO_____

If Yes. What program are you going into _____

4. What percentage of educational time in the Technical Drafting Tool Design program should be spent on CAD?

1. _____100% 4. _____70%

2. _____90% 5. _____60%

3. _____80% 6. _____50%

5. Please rate the quality of instruction you have received in the Technical Drafting Tool Design program.

	Excellent		*Average*		*Poor*
1. Quality of the material presented in class.	A	B	C	D	E
2. Material presented meets current standards.	A	B	C	D	E
3. Pace of material presented is appropriate.	A	B	C	D	E
4. Overall equipment quality and condition.	A	B	C	D	E
5. Instructors care about your learning.	A	B	C	D	E
6. Relevance of material presented.	A	B	C	D	E
7. Difficulty of material in reference to the level of the course.	A	B	C	D	E
8. Assignment objectives are well thought out and clear to the student.	A	B	C	D	E
9. Use of media, white board, slides, visuals, video, overheads, multi-media	A	B	C	D	E
10. Lectures are well prepared and organized.	A	B	C	D	E
11. Material is reviewed to insure students have gained an understanding of the information.	A	B	C	D	E
12. Student evaluation and grading is well explained and clear to the student.	A	B	C	D	E
13. Testing and evaluation procedures are fair.	A	B	C	D	E

Comments:_____

_____

_____

_____

_____

_____

6. From what you have experienced in the Technical Drafting Tool Design program, how would you rate the quality of the following?

	Excellent		Average		Poor
1. CAD hardware	A	B	C	D	E
2. CAD software	A	B	C	D	E
3. Classrooms (lighting, seats, paint)	A	B	C	D	E
4. Text Books	A	B	C	D	E
5. Plotters	A	B	C	D	E
6. Printers	A	B	C	D	E
7. Faculty Advising	A	B	C	D	E
8. Reference Materials (books, training aids)	A	B	C	D	E
9. Drafting boards	A	B	C	D	E
10. Lab hours evenings	A	B	C	D	E
11. Lab hours weekends	A	B	C	D	E

7. What could Ferris do to make the Technical Drafting Tool Design program better? Base your statements on curriculum, instruction, materials, or environment. (please respond on reverse side if you need more space.)

Section 4
Current Student Survey

The survey was administered to 53 students enrolled in the Technical Drafting Tool Design Associate Degree Program during the 1997 winter semester. The survey population consisted of 29 students in the first year and 24 students in the second year. The survey questioned the students and their perception of the quality of instruction, relevance of the courses, the use of current technology, and satisfaction with the program. Students were also asked to make suggestions of ways to improve the program. The survey also requested information about recruiting and how best to improve our efforts toward recruiting. The survey asked students if they planned to continue their studies to obtain a four year degree.

Summary of The Data

In the question asking the students to rate the quality of the program, most items were rated above 70%. The students perceive the quality of instruction to be above average. 72% of the students are going on for a bachelors degree. 76% indicated high school teachers, counselors or the reputation of the program influenced their decision to select the TDTD program. 72% responded that the quality of the CAD equipment is above average. 59% feel the drafting boards were average or below. 45% and 56% respectively feel the plotters and printers are below average. 81% of the students feel the instructional material is relevant. The following results will provide a complete view of the survey.

Survey Results

Question number 1:

Why did you select the Technical Drafting Design Program at Ferris ?

30% Of the respondents felt that high school teachers were the most influential
25% Counselors.
21% Reputation of the program
15% Friends
13% Family
8% Advertising

Some respondents selected more than one of the options. A few students gave other options such as Career Technical Center, Catalogue description, drafting interest and Plastics Degree.

Question number 2:

What could Ferris State University do to better promote the Technical Drafting Tool Design Program?

59% Felt a visit with their High School class to FSU and the TDTD program.
49% Felt a personal visit to FSU would be helpful
47% Felt information sent to their High School Counselor would be useful.
43% Felt a visit to their H.S. by a TDTD instructor would be helpful.
34% Felt a video about the program would be useful.
26% Felt a visit to their H.S. by an administrator would be helpful.
6% Felt television advertising would help promote the program.
5% Felt radio advertising would be a useful tool in promoting the program.
Some respondents selected more than one of the options.

Question number 3:

Do you plan on obtaining a four year degree?

72% said yes
28% said no

of those students going on for a four year degree:

12 are going into Product Design Engineering Technology
10 Plastic Engineering Technology.
6 Manufacturing Engineering Technology
7 Are undecided

Question number 4:

What percentage of educational time, in the Technical Drafting Tool Design Program, should be spent on CAD?

2 said 100%
7 said 90%
23 said 80%
16 said 70%
4 said 60%
1 said 50%

Question number 5:

Please rate the quality of instruction you have received in the Technical Drafting Tool Design program.

The respondents were asked to rate the questions using the following scale.
A= excellent B= above avg. C= Average D= below avg. E= Poor

Q1. Quality of the material presented in class.
A= 23% B=54% C=23%

Q2. Material presented meets current standards.

A=32% B=53% C=11% D=4%

Q3. Pace of material presented is appropriate.

A=26% B=42% C=32%

Q4. Overall equipment quality and condition.

A=21% B=55% C=24%

Q5 Instructors care about your learning.

A=53% B=34% C=13%

Q6 Relevance of material presented.

A=30% B=51% C=19%

Q7 Difficulty of material in reference to the level of the course.

A=15% B=62% C=19% D=4%

Q8 Assignment objectives are well thought out and clear to the student.

A=13% B=51% C=32% D=4%

Q9 Use of media, white board, slides, visuals, video, overheads, multi-media.

A=11% B=64% C=25%

Q10 Lecture are well prepared and organized.

A=23% B=53% C=24%

Q11 Material is reviewed to insure students understand the material.

A=31% B=46% C=19% D=4%

Q12 Student evaluation and grading is well explained and clear to the student.

A=32% B=38% C=24% D=6%

Q13 Test and evaluation procedures are fair.

A=29% B=52% C=19%

Question number 6:

From what you have experienced in the Technical Drafting Tool Design program, how would you rate the quality of the following?

The respondents were asked to rate the questions using the following scale.
A= excellent B= above avg. C= Average D= below avg. E= Poor

Q1 CAD hardware

A=28% B=44% C=28%

Q2 CAD software

A=38% B=28% C=26% D=4% E=4%

Q3 Classrooms (lighting, seats, paint).

A=35% B=44% C=21%

Q4 Text Books

A=21% B=46% C=29% D=4%

Q5 Plotters

A=17% B=38% C=31% D=8% E=6%

Q6 Printers

A=17% B=27% C=44% D=8% E=4%

Q7 Faculty advising

A=37% B=37% C=26%

Q8 Reference material (books, training aids)

A=17% B=45% C=34% D=4%

Q9 Drafting boards

A=15% B=26% C=30% D=17% E=12%

Q10 Lab hours evenings

A=25% B=35% C=31% D=6% E=4%

Q11 Lab hours weekends

A=27% B=33% C=25% D=8% E=7%

Question number 7:

What could Ferris do to make the Technical Drafting Tool Design program better? Base your statements on curriculum, instruction, materials, or environment.

See the attached comment sheets for relevant information.

TDTD Current Student Survey Comments

Comments:

People entering this program need to know if outside time is going to be nessary for the courses they will be in! Also a rough estimate on how much extra time! A clear description of all courses also needs to be confirmed with them!

Mr. Eldridge is a terrific teacher and explains the material very well. Mr. Rose needs to explain things more and clarify alot more when he assigns something.

I think Ferris should employ more tech support for the computer labs and board labs after class. The help is insufficient for the amount of people that use the labs.

This program is very educational and helpful. So far, I have been able to understand and learn many more objectives that I did not know before. The teachers are great and know what is going on. I feel that this program is very good and is recomendable.

It's an excellent field and leaves alot of options open for a 4yr degree to pursue what you are most interested in!!

Need to get better communication between faculty on materials covered in class, and stick to the standards used in industry today. (Ie. AutoCAD instead of Personal Designer. We never use it but spend a semester and a half using it.)

A clear drive by faculty to provide info on jobs and or roughts for further education.

Short Changed: CAD 13 should have been installed at the beginning of the year. Not the last half of the winter semester.

I think GD&T should be applied more in the Die/Mold courses → as far as the part is concerned. Need more females in Program!! (Good looking ones). Good Music- Cheboygan Station!

I feel that there was some material left out of my learning process during my first year hare at Ferris State. Most of my 2nd year is satisfactory. This could be an excellent program if it was taken serious by the Board.

Plotters need HELP!

I didn't feel that instructors spent enough time in the actual classroom. Whenever a question needed to be answered,... No Body seemed to know where the teacher was.

Work is at times excessive a more lengthly time to do extensive (and forgin for that matter) assignments. 1 Assignment in mold/design should be given and completed then a field trip to get an understanding so you know what your trying to do!! Working and hands on is the best way to understand.

Small monitors in the upstairs.

5th floor is TDTD and only TDTD, not first floor. 2nd year should have priority. Auto CAD needs to be taught more in detail. Use only release 13. Solids are a necessity. I will be entering the job field and know nothing about solids. Instructors need to be more readily available. Printing hardware needs to be improved. Printing situation terrible.

Overall good and fun program.

None

Teachers do a good job of making sure you understand.

I feel often the work can be overwhellming for someone who works, has a family, and educationial classes.

None

7. What could Ferris do to make the Technical Drafting Tool Design program better? Base your statements on curriculum, instruction, materials, or environment.

People considering this program should no exactly what type of classes they will be taking, all the classes of the program should be described well, along with extra expenses with the course.

Try to get at least one other class time so students have a choice.

Instructors should be evaluated. 2 out of the 3 instructors I have had in the TDTD program have been exceptional. 1 however, leaves much to be desired.

Leave labs open later on weekdays and weekends. Resurface drafting tables.

I think the curriculum could be more based on what is need in everyday work in industry.

I believe that he only thing wrong is not enough CAD time. It is also too hot in the rooms.

Get better lighting and better drawing boards.

More field trips or videos to see and better understand the process envolve overall in the Tech Drafting Tool Design program.

Have more in depth training on just one system, instead of AutoCAD and PD.

In my opinion Ferris needs to put more money into the TDTD program to help it stay above the requirements for jobs in the feild.

More example of dies, and molds.

Have guest speakers once in awhile to discuss their jobs... And to answer any of our questions about their actual jobs they may have in TDTD field.

The program must always strive to keep the students informed.

Take a good look at this servey and see what the students are really saying.

Needs to be more hands on, real life visual aides, field trips. Its hard to design a die/mold when you've never seen on in operation, or to fully understand the texture, size, weight, hardness, and operation of components unless you actually see them. Field trips give you the "bigger picture" which we should have twice every semester of the 2nd year.

For the most part the program's a good base for learning. I think that some concern should be taken in the curriculum planning.

Better equipment.

You shouldn't have to pay extra for the job placement office.

Get printing media that works as well as computer software that will not lock up so students do not lose drawings.

Instructor do know what their doing, and know how to teach, many students just get frustrated when they can't find the teacher during class.

Seeing an UP TO DATE die would help understand. When we design a die/mold you design it current with correct tech. We need to see new technology dies/molds first hand. We need to see them work and operate. Rather then 1930 cheeseball overheads that tell me less then basics.

Provide Velum Paper instead students buying all the time.

More CAD time and more relevant software (PD?)

The network need to WORK. Get a network that is STABLE all the time. Students need their OWN drive for large drawings. System needs to be changed to WIN 95, WIN 3.11 is obsolete.

Number of computer terminals seems to be adequate. Lab hours especially on weekends need to be longer. Counselors need to be more in touch with students meaning that more information needs to be given such as jobs, job available, graduation. Do like atmosphere of "lab" meaning that we are on our own and it is like a job environment.

Another CAD system other than AutoCAD.

Spend more time with CAD systems.

Provide field trips, ect.

Drawings should be simpilar to start with and work up to more difficult objects.

It would be nice if former graduates with jobs could come and tell us of their experiences. They could also give us some background on what their field is about.

Section 5 Faculty Perceptions
Contents

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

FACULTY PERCEPTIONS

1997 PROGRAM REVIEW SURVEY

TECHNICAL DRAFTING / TOOL DESIGN

This survey was completed after careful review of the other surveys conducted for this program review. The concerns, comments. criticisms, responses, and recommendations of graduates, students, employers, and advisory committee members were evaluated and the questions for this survey were determined, in the most part, from those responses. The confidence expressed by the students and graduates in the faculty's ability and knowledge of the industry and in the presentation of the materials and industrial related applications affirm your role in this review process. It is of greatest importance that the views and opinions of each faculty member be expressed to continue this program's quality education

Please complete and return. Your assistance is sincerely appreciated.

Curriculum perceptions

1. **The TDTD program should be expanded to four years.**

Strongly Agree		Neutral		Strongly Disagree
1	2	3	4	5

Comments _____

2. **The amount of Geometric Dimensioning and Tolerancing should be increased.**

Strongly Agree		Neutral		Strongly Disagree
1	2	3	4	5

Comments _____

3. **The teaching and assigning of team projects should increased and possible CIM projects should be considered.**

Strongly Agree		Neutral		Strongly Disagree
1	2	3	4	5

Comments _____

4. **More computer aided engineering (CAE) courses and/or projects should be considered.**

Strongly Agree		Neutral		Strongly Disagree
1	2	3	4	5

Comments _____

5. **What percent of educational time in the Technical Drafting / Tool Design program should be spent on CAD?**

100%_____ 70%_____

90%_____ 60%_____

80%_____ 50%_____

6. **If we were to reduce the amount of time spent on the drawing board, what objectives do you feel are the most important to be learned on the board? Please check all items that you feel are important board skills.**

	Important	Not Important	No Opinion
Geometric Construction			
Orthographic Projection			
Sketching			
Sectioning			
Auxiliary Views			
Dimensioning			
Assemblies			
Descriptive Geometry			

7. **For each of the items in the left hand column, please rate it's importance to the program and cirriculum at the present time.**

	vital to program	necessary	should be included	somewhat necessary	Not required
CAD Solid models					
Parametric models					
Rapid prototyping					
CAE statics and strengths					
CAE kinematics					
CAE moldfill					
GD&T					
CIM and other integrated technology					

8. **Looking toward the next five years and beyond, what subjects and topics should be emphasized in the TDTD two-year degree?**

	Greatly Emphasized	Somewhat Emphasized	Not Important
Board Drafting			
CAD Drafting			
Mold Design			
Die Design			
Jig, Fixture, Gage Design			
Special Machines			
Product Design			
Dimensioning, Tolerancing, GD&T			
CAE Applications			
3d and surfaced models			
Solid Modeling			
Parametric Technology			
Rapid Prototyping			
Rapid Tooling			

Machine Tool			
Tool Building			
Tool Path (CAM)			
CMM			
Laser Measuring			
Virtual Reality			
Other_____			

9. **From your perspective, what are the major strengths and weaknesses of the curriculum for Technical Drafting/Tool Design program?**

_____

_____

_____

_____

10. **If you could change the Technical Drafting / Tool Design program in any way you desired, what would you do? This may include program content, materials, name, methods or configuration. Please be as open and candid as possible.**

11. **What resources would be necessary to change the program in the manner that you have listed above?**

12. **Rate the present resources and equipment.**

	Excellent	Above average	Average	Below average
Classrooms				
Drafting Boards				
Drafting Machines				
Seating				
CAD hardware				
Computer lecture stations				
Plotters, printers				
CAD software				
CAE software				

FACULTY PERCEPTIONS

Introduction: The responses listed in the summary below were solicited from the four full time faculty and the faculty member on a one year contract teaching the engineering technology courses. All of the respondents have had industrial experience in the drafting and or design fields, and have kept current with the latest changes in the industry. The survey was completed after careful review of the other surveys conducted for this program review. The concerns, comments. criticisms, responses, and recommendations of graduates, students, employers, and advisory committee members were evaluated and the questions for this survey were determined, in the most part, from those responses. The confidence expressed by the students and graduates in the faculty's ability and knowledge of the industry and in the presentation of the materials and industrial related applications affirm their role in this review process. It is of greatest importance that the views and opinions of each faculty member be expressed in order to continue the Technical Drafting - Tool Design programs excellence in education.

Summary of faculty responses:

The folowing statements are a summary of the responses to the survey of faculty. The numbers preceding the statement are the number of the survey question.

1. Although the rating scale shows faculty reluctant to expand the TDTD program to a Bachelors level program, the comments indicate that there is need to expand the technology with some form of four year degree. A theme in the comments is the retaining of the present AAS degree with the advanced degree as an addition to it.
2. The faculty recommend an increase in GD&T.
3. An increase in team and/or CIM projects has also been recommended by the faculty.
4. A need to increase the amount of Computer Aided Engineering has also been recognized by the faculty.
5. The faculty recommendatation for the amount of time spent on CAD would have about 75% of the course time utilizing CAD, up from about 40%. To implement this change a new computer laboratory would be required.

6. The faculty strongly recommend that the the skills presently taught in the drawing board class should be retained. To accomplish this many of these skills would have to be taught in the CAD laboratory.
7. Computer applications received a mixed evaluation by the faculty. CAD solids, parametric models, and GD&T received a vital to the program rating. CAE moldfill received a necessary rating. Rapid prototyping, CAE statics and strengths, CAE kinematics, and CIM recieved a should be included rating.
8. Please refer to the survey results.
9. Please refer to the comments in the survey results for the strengths and weaknesses of the program.
10. Please refer to the survey for recommended changes to the program.
11. Please refer to the survey for resources needed.
12. The facilites and equipment rated as average to above average were the classrooms and seating for 2 of the three classrooms. CAD hardware and software was rated as average. Drafting boards, drafting machines, seating for one classroom, plotters and printers, and CAE software were rated below average.

Factulty perception survey results:

The numbers, in bold italicized type, below the responses or in the response box indicate how many faculty members selected each response.

1. **The TDTD program should be expanded to four years.**

Strongly Agree		Neutral		Strongly Disagree
1	2	3	4	5
	2		***2***	***1***

Comments

1. ***Should be a part of a four year degree with portions of the TDTD program incorporated into it, but keep AAS in TDTD***
2. ***Maybe expand to an Associates plus a Bachelors with the Bachelors having more Engineering aspects.***
3. ***General Education requirements have taken away, in the move from quarters to semesters, several areas of the TDTD program which diminish it's completeness.***
4. ***The increase in technology and the TDTD graduates involvement as design team members require the faculty to examine an expansion. The Associate degree must not be eliminated for this expansion.***

2. **The amount of Geometric Dimensioning and Tolerancing should be increased.**

Strongly Agree		Neutral		Strongly Disagree
1	2	3	4	5
2	***1***	***1***	***1***	

Comments

1. GD&T is being used by many companies, especially useful for students going into Product design.

3. **The teaching and assigning of team projects should increased and possible CIM projects should be considered.**

Strongly Agree		Neutral		Strongly Disagree
1	2	3	4	5
	3	***2***		

Comments

1. The use of software to create data exchange beween programs should be looked at.
2. Much of the industry uses team approaches, Computer Integrated Manufactuing and/or other team methods should be available to our students.

4. **More computer aided engineering (CAE) courses and/or projects should be considered.**

Strongly Agree		Neutral		Strongly Disagree
1	2	3	4	5
	3	***1***	***1***	

Comments

1. Front door engineering is more cost effective. Rather than build a tool and find the part is poor it is more effective to catch errors before they are machined. Our students could cut down testing time if they knew the testing program.
2. With the change to semesters came the loss of the Statics and Strength and Kinematics courses. For a design student to leave this university without the knowledge of forces and motion is a crime. CAE courses present these concepts in less time than the previous courses did.

5. **What percent of educational time in the Technical Drafting / Tool Design program should be spent on CAD?**

100%_____ 70%_____***2***_____

90%_____***1***_____ 60%_____***1***_____

80%_____***1***_____ 50%_____

6. **If we were to reduce the amount of time spent on the drawing board, what objectives do you feel are the most important to be learned on the board? Please check all items that you feel are important board skills.**

	Important	Not Important	No Opinion
Geometric Construction	4		1
Orthographic Projection	5		
Sketching	3		2
Sectioning	5		
Auxiliary Views	5		
Dimensioning	3	2	
Assemblies	2		3
Descriptive Geometry	3	2	

7. **For each of the items in the left hand column, please rate it's importance to the program and cirriculum at the present time.**

	vital to program	necessary	should be included	somewhat necessary	Not required
CAD Solid models	3	2			
Parametric models	2	2	1		
Rapid prototyping	1		3	1	
CAE statics and strengths	1	1		3	
CAE kinematics	1	1	1	2	
CAE moldfill	1	2	1	1	
GD&T	3	2			
CIM and other integrated technology		3		2	

8. **Looking toward the next five years and beyond, what subjects and topics should be emphasized in the TDTD two-year degree?**

	Greatly Emphasized	Somewhat Emphasized	Not Important
Board Drafting	1	4	
CAD Drafting	5		
Mold Design	5		
Die Design	5		
Jig, Fixture, Gage Design	4	1	
Special Machines	1	1	3
Product Design	5		
Dimensioning, Tolerancing, GD&T	4	1	
CAE Applications	1	2	2
3d and surfaced models	3	2	
Solid Modeling	5		
Parametric Technology	3	2	
Rapid Prototyping	1	4	
Rapid Tooling	1	3	
Machine Tool	5		
Tool Building	1	4	
Tool Path (CAM)	2	3	
CMM		4	1
Laser Measuring		4	1
Virtual Reality		1	4
Other_____			

9. From your perspective, what are the major strengths and weaknesses of the curriculum for Technical Drafting/Tool Design program?

Strengths:

1. *CAD and board fundamentals - tooling, gages, die and mold design, GD&T*
2. *Hands on experience for students, alumni throughout great lakes region.*
3. *Industrial based, quality, caring faculty with hands on time for students.*
4. *Emphasis on current technologies.*
5. *Caring instructors that take time to work with students one - to - one with hands on activities to enhance lecture.*

Weaknesses:

1. *Need more CAD.*
2. *Advanced projects in all areas above.*
3. *Lack of respect from College of Technology/ University.*
4. *Laboratory hours with faculty present, this could possibly be reduced some. (independent lab hours for students with tutor or other student help would replace.)*
5. *Lack of Statics and Strengths, Kinematics, Fluid power and other related subjects that were once a part of this program.*

MET

10. If you could change the Technical Drafting / Tool Design program in any way you desired, what would you do? This may include program content, materials, name, methods or configuration. Please be as open and candid as possible.

1. *Change name to CAD Drafting and Tool Design.*
2. *Reduce labs by 20-25% - but schedule lab time for students.*
3. *Add 2nd dedicated computer lab.*
4. *Establish teardown room.*
5. *Get new tables, machines.*
6. *Look at reducing lab hours with faculty present.*
7. *More computers for first year students on fifth floor.*
8. *Title change to CAD Drafting and Tool Design*
9. *CAD lectures in other rooms than CAD area.*
10. *Increase enrollment.*
11. *Cut down second year board work and add a second CAD package to learn (ie. Cadkey) We would then have a word driven and an icon driven software. This would help students become comfortable with more than one CAD package.*
12. *Review content of CAE (TDTD 222), possibility of machine elements based on industrial survey.*

11. What resources would be necessary to change the program in the manner that you have listed above?

1. *Additional computers, labs and software.*
2. *More computers for student use on fifth floor.*
3. *Lap-top computers for lectures and recruiting.*
4. *Curriculum analysis.*
5. *$30k for initial computer lab.*
6. *$5k for teardown lab.*
7. *Training?*

12. **Rate the present resources and equipment.**

	Excellent	Above average	Average	Below average
Classrooms		*3*	*2*	
Drafting Boards			*2*	*3*
Drafting Machines			*1*	*4*
Seating		*5 (2/3)*		*4 (1/3)*
CAD hardware		*2*		*2*
Computer lecture stations			*2*	*3*
Plotters, printers			*2*	*3*
CAD software		*3*	*2*	
CAE software		*1*	*2*	*2*

Section 6 Advisory Committee Perceptions
Contents

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

ADVISORY COMMITTEE

1997 PROGRAM REVIEW SURVEY

TECHNICAL DRAFTING / TOOL DESIGN

Please complete and return in the enclosed envelope. Your assistance is sincerely appreciated.

1. The Advisory Committee meets often enough.

Strongly Agree		Neutral		Strongly Disagree
1	2	3	3	5

Comments_____

_____

2. The Advisory Committee is adequately utilized by the Technical Drafting / Tool Design Program.

Strongly Agree		Neutral		Strongly Disagree
1	2	3	3	5

Comments_____

_____

3. Suggestions from the Advisory Committee are encouraged and adopted by the program.

Strongly Agree		Neutral		Strongly Disagree
1	2	3	3	5

Comments_____

_____

4. Long-term employment prospects remain strong.

Strongly Agree		Neutral		Strongly Disagree
1	2	3	3	5

Comments_____

_____

5. What percent of educational time in the Technical Drafting / Tool Design program should be spent on CAD?

100%_____ 70%_____

90%_____ 60%_____

80%_____ 50%_____

6. If we were to reduce the amount of time spent on the drawing board, what objectives do you feel are the most important to be learned on the board? Please check all items that you feel are important board skills.

	Important	Not Important	No Opinion
Geometric Construction			
Orthographic Projection			
Sketching			
Sectioning			
Auxiliary Views			
Dimensioning			
Assemblies			
Descriptive Geometry			

7. From your knowledge of the Technical Drafting/Tool Design program, how would you rate the following?

	Excellent	Above Average	Average	Below Average	No Opinion
CAD Hardware					
CAD Software					
Classrooms (lighting, seats, paint, lab arrangement)					
Drafting Boards					
Textbooks					
Plotters					
Printers					
Reference Materials (books, training aids)					

For your information, we recently installed new Pentium 32 MEG RAM PC's. We are currently using AutoCAD 13 with mechanical desktop software. This allows us to teach solids with parameters.

8. Looking toward the next five years and beyond, what subjects and topics should be emphasized in the TDTD two-year degree?

	Greatly Emphasized	Somewhat Emphasized	Not Important
Board Drafting			
CAD Drafting			
Mold Design			
Die Design			
Jig, Fixture, Gage Design			
Special Machines			
Product Design			
Dimensioning, Tolerancing, GD&T			
CAE Applications			
3-D Models with Surfaces			
Solid Modeling			
Parametric Technology			
Rapid Prototyping			
Rapid Tooling			
Machine Tool			
Tool Building			
Tool Path (CAM)			
CMM			
Laser Measuring			
Virtual Reality			
Other			

9. From your perspective, what are the major strengths and weaknesses of the Technical Drafting/Tool Design program at Ferris State University?

_____

_____

_____

_____

10. If you could change the Technical Drafting / Tool Design program in any way you desired, what would you do? This may include program content, materials, name, methods or configuration. Please be as open and candid as possible.

Section 6
Advisory Committee Survey

The purpose of the advisory committee survey was to provide information from the committee on curriculum, outcomes, facilities, equipment, graduates, and trends that might affect job placement. Recommendations for improvement were also requested. The committee members were sent the survey during March, 1997, with a requested return date of April 15. Of the 9 surveys sent, only two were returned. The number of responses was disappointing and surprising. The advisory committee is an important supporter of the Technical Drafting Tool Design Program. The committee provides important suggestions and input for improvement and change. The program takes their advise seriously and has implemented many of their suggestions. The committee is very supportive of the TDTD program and has always responed to our needs A follow up telephone call was placed to the members requesting participation. From those who were reached, an additional 5 surveys were received. With 78% of the advisory committee responding the following information was obtained.

Summary of the Data

Of those who responded, the majority feel the curriculum is current and relevant. The equipment and facilities are adequate. The results did not indicate significant trends or changes in the near future. The use of solids and surfacing was encouraged. Teaching of parametrics is acceptable while the exposure to rapid prototyping in not important. The future in the tool design field appears to be excellent. There was a mixed response as to how much time should be spent on CAD.

Survey Results

The following are the questions and the responses from the committee members. The data for question 1 through 4 was separated into the following classifications.

A= Strongly agree B= somewhat agree C= Neutral D= somewhat disagree E= Strongly disagree

1. The Advisory Committee meets often enough.

   A=0 B=1 C=4 D=1 E=1

2. The Advisory Committee is adequately utilized by the Technical Drafting Tool Design program.

   A=0 B=4 C=1 D=1 E=1

3. Suggestion from the Advisory Committee are encouraged and adopted by the program.

   A=1 B=5 C=1 D=0 E=0

4. Long-term employment prospects remain strong.

A=4 B=1 C=1 D=0 E=0

5. What percent of educational time in the Technical Drafting Tool Design program should be spent on CAD?

80%=2 70%=1 50%=3
one respondent said less than 50%

6. If we were to reduce the amount of time spent on the drawing board, what objective do feel are the most important?

The responses to question number six were classified as either

A= important, B= not important, or C= no opinion

Geometric Construction
A= 6 B= 1 C= 0
Orthographic projection
A=5 B= 0 C= 2
Sketching
A= 3 B= 3 C= 0
Sectioning
A= 5 B= 0 C= 1
Auxiliary views
A= 4 B= 0 C= 3
Dimensioning
A= 3 B= 1 C= 2
Assemblies
A= 2 B= 3 C= 1
Descriptive geometry
A= 7 B= 0 C= 0

7. From your knowledge of the Technical Drafting Tool Design program, how would you rate the following?

The responses to question number 7 were classified as:

A= excellent B= Above Avg. C= Average D= Below average E= No opinion

CAD Hardware A= 0 B=3 C=1 D=1 E=2

CAD Software A=0 B=3 C=1 D=1 E=2

Classrooms A=1 B=4 C=1 D=0 E=1

Drafting Boards	A=1	B=1	C=3	D=0	E=2
Textbooks	A=2	B=1	C=1	D=0	E=3
Plotters	A=0	B=1	C=1	D=1	E=4
Printers	A=0	B=1	C=0	D=1	E=5
Reference Materials	A=1	B=1	C=2	D=0	E=3

8. Looking toward the next five years and beyond, what subjects and topics should be emphasized in the TDTD two-year degree?

The responses to question number 8 were classified as:

A= Greatly Emphasized	B= Somewhat Emphasized	C= Not important
Board Drafting	A=2	B=5	C=0
CAD Drafting	A=4	B=2	C=1
Mold Design	A=5	B=2	C=0
Die Design	A=5	B=2	C=0
Jig, Fixture, Gage Design	A=3	B=3	C=0
Special Machines	A=2	B=4	C=1
Product Design	A=3	B=4	C=0
G,D&T	A=7	B=0	C=0
CAE Applications	A=1	B=6	C=0
3-D Models with Surfaces	A=2	B=4	C=1
Solid Modeling	A=2	B=4	C=1
Parametric Technology	A=1	B=4	C=2
Rapid Prototyping	A=0	B=4	C=3
Rapid Tooling	A=0	B=5	C=2
Machine Tool	A=1	B=6	C=0

Tool Building	A=0	B=7	C=0
Tool Path (CAM)	A=0	B=6	C=1
CMM	A=0	B=3	C=4
Laser Measuring	A=0	B=1	C=6
Virtual Reality	A=0	B=0	C=7

9. From your perception, what are the major strengths and weaknesses of the Technical Drafting Tool Design program at Ferris State University?

Strengths:

1. Solid foundation
2. Large quantity of lab time is helpful.
3. Die design class is exceptional.
4. Design principles and terminology experience is excellent.
5. Basic geometry construction skills, and dimensioning skills with exposure to mold and product design.
6. Good knowledgeable faculty and current equipment.

Weaknesses:

1. Too much time spent in CAD.
2. Too much fragmentation of curriculum (trying to do too much)
3. Need appropriate connection to the "real" world.
4. The educational package must be designed as portable to fit the needs of employers. I am concerned that methods and tools will eclipse understanding when new tools are added.

10. If you could change the Technical Drafting/Tool Design program in any way you desired, what would you do? This may include program content, materials, name, methods or configuration. Please be as open and candid as possible.

1. Add a public speaking course.
2. Stress basics.
3. Keep Drawing boards.
4. Teach basics and fundamentals.
5. Know descriptive geometry.
6. Design principles are very important. More design projects, the design process is very important.
7. Make the program a 12 month program.
8. Make two new summer terms for summer internships.
9. Part of the pay for summer interns or apprenticeship could go to the college for next term student expenses.

10. Add internship/co-op experiences
    Determine that outcome goals are in line with employer needs.
    Create path of emphasis/specialty
        CAD
        Product Design
        Tool Design
        NC/CNC
    Incorporate Technical communicaton requirements into project work.
    Require team coordination that involves planning and critical path.

Technical Drafting & Tool Design

APRC 1997-1998

Section 3 of 3

Section 7 Labor Market Demands
Contents

Section 7 Labor Market Demand

Preface:

The Michigan Occupational Information System (MOIS) and the Bureau of Labor Statistics simply does not list or track the design component of the Tool and Die industry.

The information contained in the following pages of this section reflect on the ***drafting*** portion of the Technical Drafting and Tool Design program. Information on the nature of Tool, Die, and Injection Molding *Design* (the tool design portion of the program) is not addressed.

> As a basis of reference, information provided by MOIS, the Tool and Die Maker occupation (moiscript #026) indicates:
>
> > Michigan's Employment Outlook to 2005 for Tool and Die makers should realize a 7.8% growth.

It is a safe assumption that the tool and die design portion of the tool and die industry will closely follow that of the tool and die making portion.

Labor Market Analysis
Employment and Outlook

Information Provided By: Michigan Occupational Information System 1997:

Nationally, there were about 303,600 Drafters employed in 1994. Employment is expected to increase more slowly than the average for all occupations through the year 2005. About 3.0% of them were self-employed.

The industry distribution for Drafters looked like this:

SIC CODE	INDUSTRY	% EMPLOYED
80870	Engineering & Management Services	33.8
41000	Durable Goods Manufacturing	31.7
80730	Business Services	12.2
50000	Transportation and Public Utilities	5.8
30000	Construction	5.3
90000	Government	3.5
42000	Nondurable Goods Manufacturing	3.0
60000	Wholesale and Retail Trade	2.3
- -	Other	2.4

Drafters will be needed to support a growing number of scientists and engineers and to deal with increasingly complex design problems. However, widespread use of computer-aided design equipment will increase productivity and could affect employment growth. Individuals with associate degrees in drafting and those trained in computer-aided equipment will find the best opportunities.

There were about 22,375 Drafters employed in Michigan in 1994. Most worked in urban areas. The majority worked for manufacturing companies or provided drafting services for a variety of businesses. Most of the Drafters employed in manufacturing worked for companies that manufacture cars, trucks, and related transportation equipment. Almost all of the Drafters employed in service industries worked for companies providing engineering and architectural services.

According to the 1990 Census, 12.2% of this occupation were female; 3.7% were black; 1.3% were asian and pacific islanders; and, 1.0% were persons of hispanic origin.

The employment of Drafters is expected to grow faster than the average for all occupations in Michigan through the year 2005. An average of 800 job openings is expected with 390 due to growth and 410 annually due to replacement of Drafters who retire, die, or leave the labor force for other reasons. Additional openings will occur as workers change jobs or occupations.

Because of the increasing use of electronic drafting equipment and computers to do routine tasks, opportunities will be best for Drafters with advanced skills. A broad range of computer-aided design techniques is becoming necessary to compliment a thorough knowledge of drafting fundamentals and design theory. Employers also look for neatness.

Drafters are highly concentrated in industries that are sensitive to cyclical swings in the economy. Therefore, during an economic recession, designed and fewer drafting services are needed.

MICHIGAN'S EMPLOYMENT OUTLOOK TO 2005

EMPLOYMENT AND OUTLOOK REGIONS	(1994) NUMBER EMPLOYED	PERCENT GROWTH	PROJECTED YEARLY JOB OPENINGS
State Total	22,375	19.1%	800

EARNINGS AND ADVANCEMENT

Earnings of Drafters depend on their education and experience and the location and type of the company for which they work. The highest earnings of all Drafters' wages are found in urban areas and for Drafters working in manufacturing companies. Experienced Drafters operating computer-aided design equipment generally have higher salaries than other drafters.

Nationally, the median annual earnings of Drafters were $31,668 (1995). Computer-assisted Drafters earned salaries ranging from $22,200 to $40,000 (1995). Drafters working for private employers earned annual average salaries ranging from $20,400 to $46,100 depending on their level of responsibility and experience.

Drafters with an associate degree employed by the federal government in 1996 had starting salaries of $17,055 per year. Those with less education and no experience began at $15,913. The salaries of these federal government workers may be higher in some urban areas.

In Michigan, Drafters earned and average annual income between $22,764 and $33,768 (1995).

Yearly earnings for Drafters working in Michigan in 1994 were:

Area	Average	Middle Range
Detroit	$33,997	$20,800 - $45,812
Benton Harbor	$28,370	$15,360 - $44,100
Jackson	$29,167	$20,530 - $40,664
Ann Abor	$30,343	$22,838 - $41,952
Grand Rapids	$26,777	$18,720 - $36,140

In mid 1996, drafting aides employed by the State of Michigan earned between $21,318 and $29,545 per year. Drafting technicians earned between $21,318 and $41,614 during the same year. Supervisory drafting technicians earned between $30,380 and $50,258.

The 1993 graduates of Michigan vocational educational programs working in jobs related to drafting earned a beginning average of $15,080 per year in 1995.

Apprentices in a drafting program usually begin at about 40% of a full qualified Drafter's wage at the beginning of their apprenticeship.

Fringe benefits received by Drafters depend on the size and type of company worked for and the length of time the Drafter has worked there. Most Drafters receive paid holidays, vacations, and sick leave; health, accident, and dental insurance; and pensions. Some employers may also offer stock purchase or savings plans.

Drafters without experience or postsecondary technical training usually start out as tracers or detailers. Some may begin as apprentices. It usually takes 3 to 4 years for beginning Drafters to become qualified Drafters. Some Drafters may complete college programs which allow them to become technicians, engineers, or architects. These professions require more education and training than drafting.

Information Provided By: Bureau of Labor Statistics June 1997 a National Profile:

Employment of drafters is expected to grow 9% per year though the year 2005. Industrial growth and increasingly complex design problems associated with new products and manufacturing increase the demand for drafting services. However, greater use of CAD equipment by architects and engineers, as well as drafters, may offset this growth in demand. Although productivity gains from CAD have been relatively modest since its use became widespread, the technology continues to advance. CAD is expected to become an increasingly powerful tool, simplifying many traditional tasks and enabling some engineers and architects to do some drafting tasks themselves.

Individuals who have at least 2 years of training in a technically strong drafting program and who have experience with CAD systems will have the best opportunities. Although few, if any, jobs will be generated by employment growth, many job openings are expected to arise as drafters move to other occupations, retire, or leave the labor force for other reasons.

Employment of drafters is highly concentrated in industries that are sensitive to cyclical swings in the economy, such as engineering and architectural services and durable goods manufacturing. Median annual earnings of drafters who worked year round, full time were about $28,500 in 1994; the middle 50 percent earned between $21,500 and $38,600 annually. The top 10 percent earned more than $50,200, while the bottom 10 percent earned less than $16,400.

According to a survey of workplaces in 160 metropolitan areas, the most experienced drafters had median earnings of about $38,600 a year in 1993, with the middle half earning between about $35,500 and $42,600 a year.

Information provided by: Bureau of Labor Statistics

Occupations With Largest Employment Requiring Post-Secondary Training or an Associate's Degree

Below are 25 occupations with the highest expected employment during the period 1994 - 2005 for those occupations that only require post-secondary training but less than 4 years of college. *

OCCUPATIONAL TITLE	EMPLOYMENT, 1994 (in thousands)
Secretaries, except legal and medical	2,842
Registered nurses	1,906
Licensed practical nurses	702
Hairdressers, hairstylists, and cosmetologists	595
Data entry keyers, except composing	395
Welders and cutters	314
Drafters	**304**

continued.....

Company Names, Job Titles, and Locations of Firms That Have Recruited at Ferris for Technical Drafting/Tool Design Students
1996-1997 Information provided by Placement Office

COMPANY	JOB TITLE	LOCATION
Savant, INC.	Cad Operator/Designer	MICHIGAN
Paragon Recruiting	Cad Drafter	MICHIGAN
Cmi-Tech Center, Inc.	Tooling Designer	MICHIGAN
Thomson Saginaw Ball Screw Company, Inc.	Design Engineer	SAGINAW, MI
Tfm Remanufactured Office Furniture	AUTOCAD DRAFTSPERSON	LANSING, MI
Qualified Staffing Services	Die Designer	Flint, Mi
Hitachi Magnetics Corporation	Designer Position	Michigan
Livingston Resource Services	Tool And Die, Edm Operators	Michigan
Slocum Associates	Drafting Level I	Kalamazoo, Mi
Baldwin Alliance	Designer	Grand Rapids, Mi
Jedco, Inc.	Tool Designer/Programmer	Grand Rapids, Mi
Tool Specialties	Designer/Engineer	Missouri
Control Engineering Company	Draftsperson Position	Michigan
Precision Wire Edm Service, Inc.	Manufacturing Supervisor	Grand Rapids, Mi
Enterprise Die & Mold, Inc.	Estimator/Project Manager	Michigan
Enterprise Die & Mold, Inc.	Cad Die Designer/Detailer	Michigan
Trane Company - Detroit Based Division	Auto Cad Operator	Michigan
Van's Pattern Corp.	Apprentice Pattenmaker	Grand Rapids, Mi
Executive Search Consultants	Cad/Product Design	Michigan
Flex-Cable - Morely	Designer/Cad Operator	Michigan
Contech Division, Spx Corporation	Cad Designer	Michigan
Visual Corporations	Designers	Michigan
Hr Management Services, Inc.	Cad Detailer	Michigan
Great Lakes Employment	Drafter/Data Transfer Technician	Grand Rapids, Mi
Hitachi Manetics Corporation	Designer	Michigan
Stiles Machinery, Inc.	Cad/Layout Specialist	Grand Rapids, Mi
Target Components, Inc.	Document Control Clerk	Michigan
Cdi Corporation	Mechanical Designer	Grand Rapids, Mi
Plascore, Inc.	Cad Designer/Operator	Michigan
Crider & Assocites	Hydroforming Cad Designer/Design Engineer	St. Louis, Mo
Brimar Corporation	Designer/Detailer	Detroit, Mi
Control Engineering Company	Draftsperson	Michigan
Asg Renaissance	Cad Detailer And Designers	Michigan
Auto Die International	Die Detailer	Grand Rapids, Mi
Haworth	Technical Illustrator I	Michigan
American Seating	Cad Designer	Grand Rapids, Mi
Cdi Corporation	Catia Drafter	Grand Rapids, Mi

Calhoun Area Technology Center	Cad/Drafting Assistant	Michigan
Scottsburg Plastics, Inc.	Design Engineer	Indiana
Sp/Sheffer	Cad	Michigan
Trialon Corporation	Technical Illustrator	Lansing, Mi
Excelerated Mold Group, Inc.	Tech Drafter & Tool Designer/Proj Manager	Colorado
Intertec Design	Cad Drafter	Grand Rapids, Mi
Arbor Technical	Autocad Designer	Ann Arbor, Mi
Hi-Caliber Tool & Mold Company	Cnc Operator & Cad-Cam Trainee	Michigan
Time Engineering Service	Technical Illustrator	Michigan
Olsten Professional Technical Ser.	Cad Operator	Not Specified
Bandit Industries	Drafting	Michigan
Clestra Cleanroom Components	Cad Designer	Grand Rapids, Mi
Genzink Steel Supply	Structural Steel Detailer	Michigan
Aerotek - Grand Rapids	Technical Illustrator	Michigan
A&I Integrated Systems	Mechanical Designer	El Paso, Tx
Westshore Engineering And Surveying, Inc.	Cadd Technician	Michigan
Norma Products, Inc.	Engineering Intern -Cad/Cam	Michigan
Flex-Cable - Morley	Cad Operators	Michigan
Micro Craft, Inc.	Tool Coordinator	Michigan
Jvh Engineering, Inc.	Technical Sales Position	Michigan

Section 8 Evaluation of Facilities and Equipment
Contents

Evaluation of facilities and equipment

This analysis of facilities and equipment was developed after careful review of the responses to the surveys conducted for the review of this program. The criticisms, concerns, comments, responses, and recommendations of the respondents to the survey were given top priority in determining the state of the Technical Drafting Tool Design program's facilities, equipment and needs of technologies to continue a relevant program of instruction. Many of these needs have been previously identified in Unit Action Plans and/or minor capital improvement recommendations and some have been introduced here for the first time based on the responses to the surveys. An enhancement or clarification to each assessment has been in the form of an *italicized statement.*

Classrooms and laboratories: Most of the respondents rated the facilities as good to excellent with the few exceptions identified below.

Classroom Received good ratings. *Recently improved with new paint and accent stripes. Carpet has snags, runs and gaps.*

Heating and ventilation A few responses indicated overheating and stuffiness as problems.

Most of the heat problems were either thermostat related or students turning fans on the univents off because they were too noisy. A possible improvement would be to have the existing exhaust fans controllable by faculty.

Lighting While not specifically identified in the surveys the present fluorescent lights cause glare and shadows. *A couple of years ago the faculty was informed that new diffusers would be added to the lights, this has not been done.*

Drafting boards Some of the respondents made negative comments on the condition of the drafting boards and related equipment. *The drafting boards and drafting machines for the second year classes (SWN 504) were donated over a period of years, many are in need of repair and/or adjustment, all need painting.*

Present equipment Some criticism of the computers, printers/plotters and computer software was apparent on the survey responses and comments.

Computer hardware The majority of the criticisms leveled against the computers was for the frequent crashes and/or lockups. *Many of these problems have been eliminated with the purchase and subsequent debugging of new computers for the Swan 503 classroom.* Also identified was the lack of computer technical support. *This problem will hopefully be alleviated with changes in technical support personnel made this year.*

Printers/plotters Many respondents criticized the printing and plotting capabilities of the program. *The problem here is not one of hardware, the present printers and plotters are adequate for the present program. Most of the needs identified here are for technical assistance in the interface between the computers, software programs and output devices. Printer and plotter configuring parameters are also a concern for students and faculty. An improvement to the printing capabilities for thr program would be the aquisition of a Xerox type of printer. This printer prints black lines, reproducibles and enlarges or reduces the drawing size printed.*

Computer software Respondents to the survey indicated displeasure with obsolete, slow, imperfect computer software that commonly did not perform correctly or crashed when students tried to do assigned lab activities. *This was partially resolved with the replacement of the Personal Designer software with Autocad 13-Mechanical desktop software, but some software needs updating and/or replacing. The Algor FEA software which is used by both the TDTD and Mechanical Engineering Technology programs is obsolete and slow. A DOS program, it is very difficult to find printer drivers for. The Moldflow software presently used has not been supported by Moldflow since 1993, although Moldflow has donated updated software it can not be used due to the reluctance of the computer technical support group to load Windows 95 or Windows NT operating system.*

Availability of technologies This section of the analysis is based on the technologies recommended by the respondents to the surveys.

Increase in CAD while maintaining basic board skills These technologies have been combined. While an overwhelming majority of respondents recommended an increase in CAD applications, many have also recommended the maintaining of the basic drawing board skills. To accomplish this effectively another computer laboratory on the fifth floor of Swan building would have to be established, allowing all students in all of the present board only courses to move between the board and computer at intervals throughout the semester.

Parametric and solid CAD models Many of the respondents recommended an increase, or even total use, of parametric solids models. This could be accomplished by updating the computers to accept the Autocad 13 -Mechanical desktop software component.

Rapid prototyping Many of the respondents recommended that the curriculum include rapid prototyping capabilities. To facilitate this would require the acquisition of, or access to, an industrial quality rapid prototype machine.

Hands-on applications Many of the respondents recommended that the students have the opportunity to touch, feel, disassemble, or in other ways have a hands-on experience with products and/or tools. While the faculty have always tried to provide this experience, and the students have related machine tool course for two semesters, a room could be created, from a present storeroom, that would allow students access to tools, equipment, and products that they could have this hands-on experience with.

Multi-media presentations Many of the faculty in this program have either the skills required to create multi-media presentations and/or preprogrammed compact discs contain lecture presentations on coursework. A computer lecture station in each classroom with multi-spin CD ROM and adequate projection capabilities would allow the faculty to avail themselves of this technology.

Section 9 Curriculum Review

Section 9 Curriculum Review

The Technical Drafting and Tool Design faculty rely on several factors for the continual improvement of the program to ensure that it meets the needs of the market. It should be noted that the general educational requirements and the change to semesters has made a slight negative impact on the program, ie. related courses eliminated (8 semester hours, number of sections offered for our physics requirement reduced, Jig and Fixture component of major reduced by 50%. The negative impact realized is its ability to flow in a progressive manner. The Technical Drafting and Tool Design faculty are making plans for several curriculum changes that were initiated in part by this program review. Major factors that influence the curriculum include but are not limited to:

1. Advisory Committee. The Technical Drafting and Tool Design has a very active committee. Curriculum concerns comprise in excess of 75% of the time and energy of every meeting. Statements made by the members are taken very seriously. The committee has indicated many times that the Technical Drafting and Tool Design program must 'stress the fundamentals' (section 2 and section 3 of this report support this desire). The committee is sent a current check sheet before each meeting, and a comprehensive review ensues on each course including; method of delivery, content, time weights, and performance objective.

2. Alumni. Various instruments returned from alumni have indicated that the Technical Drafting and Tool Design program is preparing the graduate for employment with a sound educational curriculum. Refer to section 2 of this report for more detailed information. Alumni surveys have taken place in 1988, 1991, 1994, and 1997.

3. Visits to industry and trade shows. The Technical Drafting and Tool Design faculty make every effort to visit industry and international trade shows as much as practical. With the constant change in technology that affects our program it is critical that these efforts are made. Many changes in the program over the last 12 years were initiated by attending a trade show or while talking with experts in industry.

4. Program meetings. The Technical Drafting and Tool Design faculty meet on a regular basis. The topic that occupies the most time is that of curriculum. Faculty members are always eager to share new information that may have an impact on the program. With a constant pulse on the changing needs of industry, each faculty member has presented significant perspectives of change that have been incorporated into the curriculum. Examples of recent minor changes include; CAD 2D, CAD 3D, 3D surfacing, 3D Solids, Parametrics.

Section 10 Enrollment
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Section 10 Enrollment Trends

The Technical Drafting and Tool Design program has facilities for starting 46 freshmen (two sections of 23) each fall. The second year has a capacity of 40 (two sections of 20), for a combined total of 86 maximum students enrolled in the program at any one time. The figures below indicate an anomaly for the 92-93 year. The change from quarters to semesters perhaps is the reason for the higher number enrolled for 1992-93. Note: Data supplied by Office of Institutional Studies.

Enrollment	F92	F93	F94	F95	F96
Pre TDTD	0	3	2	2	4
TDTD	104	74	74	71	67

FITIAC ENROLLMENT	F92	F93	F94	F95	F96
Pre TDTD	0	3	2	2	2
TDTD	30	32	28	27	25

FITIAC retention percentages for the Technical Drafting and Tool Design program supersedes the percentages of the averages for two year programs at Ferris. The data below indicates an average one year retention rate of 71% for the period of 1992-1995.

FITIAC Retention	Base	# Returned	%
F92	30	21	70
F93	32	23	72
F94	28	19	68
F95	27	20	74

Placement and Continuing Education rates for the Technical Drafting and Tool Design program are almost identical in terms of percentages as to the rest of the AAS programs in the College of Technology. As indicated in other sections of this report, many Technical Drafting and Tool Design students ladder into the various BS programs at Ferris.

Note: Data provided by placement office.

	92-93	93-94	94-95	96-97
Employed Major	7	7	3	3
Employed Not Related	2	12	0	0
Continuing Education	29	18	14	16
Not Seeking Employment	0	0	0	0
Seeking Employment	3	0	1	0
Unknown	3	2	5	0
Total	44	28	23	19

The graduation rates for the Technical Drafting and Tool Design program are not accurate as to reflecting actual students that have completed the program. There is no requirement for a student to 'apply' for graduation from a particular program in order to be accepted into a BS laddering program. Faculty of the Technical Drafting and Tool Design program have known this for some time and are working to rectify the problem. Furthermore, institutional studies in aware of this problem and admits to the flawed data. To further complicate the process of making sure students actually graduate from a AAS program before entering a BS program, some students are required to be admitted into the BS program (in order to take classes in the BS program), and the student simply does not apply for graduation when completing the AAS program.

Section 11 Productivity
Contents

Preface

This report contains teaching cost data derived from the Ferris Faculty Load System. This is the second published edition of this report since Ferris switched from a quarter system to a semester system. The information in this report covers data from summer 1995, fall 1995, and winter 1996.

The procedures used in this report account for teaching costs only (faculty salary and fringes). Deans' costs, department costs, and equipment costs are not included. Cost data of this type must be used with caution and in association with administrative judgment. Cost data, if viewed in isolation, can be misleading.

Methodology

The costing procedures are accomplished using the Ferris Faculty Load System data. The costing system uses a faculty member's salary plus the cost of fringe benefits. For 12-month faculty, 32.5% fringe is applied for summer, fall, and winter. For 9-month faculty, 32.5% fringe is applied for fall and winter. For 9-month faculty teaching in the summer, 21.0% fringe is applied (FICA and retirement only).

The salary plus fringe is multiplied by the course credit hour and divided by the faculty member's total course credit hours taught. An average cost per course is then determined by dividing the total teaching costs, including fringes, by SCH produced by course. NOTE: University-wide, there are a few courses (primarily special studies) that have been assigned to administrators. These courses have no teaching dollars associated with them but do include the student credit hours produced.

The following is an example of the methodology described above:

	Term Salary	Courses	Course Credits
Joe Smith	$20,000	ARCH 101 211	4
		FMAN 451 211	3
		ACCT 203 211	4

Term Salary		Fringe		Course Credits / Total Credits		Teaching Cost
$20,000	X	1.311	X	4 / 11	=	$9,534.55
$20,000	X	1.311	X	3 / 11	=	$7,150.91
$20,000	X	1.311	X	4 / 11	=	$9,534.55
						$26,220.01

Pooling of all of the teaching costs and SCH's for ARCH101 courses for the year is shown below:

	Teaching Costs		SCH's Produced		
ARCH101211	$9,534.55		76		
ARCH101212	$9,010.71		88		
"	"		"		
"	"		"		
"	"		"		
	$331,916.83	/	2,011	=	$165.05

To arrive at the total cost for a degree, all courses and credits required for each instructional program were taken from the 1995-96 student checksheets. These were obtained from each instructional department. The cost of each degree assumes a hypothetical situation in which all courses required for the degree would have to be taken in one year.

The following is an example of a hypothetical program at Ferris:

Ferris State University

Program Teaching Cost 1995 -1996 (Summer, Fall, and Winter)

Program Name: WEB Master Certificate

Total Program Teaching Cost (Assumes a student will complete program in one year)	$2,711.84
Cost per SCH (Average for program)	$167.57
Program Credits Required (Total credits to graduate)	17

Course ID	Level	FSU's Teaching Cost	FSU's Student Credit Hours (SCH) Produced	Teaching Cost/SCH	Credits Required	Program Teaching Cost
WEBM101	L	$22,306.17	141.00	$158.20	3.00	$474.60
WEBM301	U	$7,866.01	63.00	$124.86	3.00	$374.57
WEBM501	G	$36,802.14	114.00	$322.83	3.00	$968.48
FREEELE	E	$25,439,177.51	236,404.00	$107.57	6.00	$645.43
LITR287	N	$11,705,592.12	94,110.22	$124.38	2.00	$248.76

Total Program Teaching Cost: This number is the total of all the *Program Teaching Costs.*
Cost Per SCH: This number is the average of all the *Teaching Cost/SCH.*
Program Credits Required: This number is the total of all the *Credits Required* for a program.

Course ID: Each course represents all sections for that specific course.
Level: L - Lower (100 and 200 level courses); U - Upper (300 and 400 level courses); G - Graduate (500 and above level courses); E - Elective courses; N - Course not offered during the year.
FSU's Teaching Cost: The teaching costs for L, U, and G are explained on the previous page. The teaching costs for E are explained in Appendix A. The teaching costs for N are explained in Appendix B.
FSU's Student Credit Hours (SCH) Produced: These numbers represent all the student credit hours produced for a specific course.
Teaching Cost/SCH: These numbers are a result of dividing *FSU's Teaching Cost* by *FSU's SCH Produced* for a specific course.
Credits Required: These numbers are the actual credits that a student needs for that specific course.
Program Teaching Cost: These numbers are a result of multiplying the *Teaching Cost/SCH* by the *Credits Required.*

See Appendix A for the costing of elective courses within a program. See appendix B for the costing of courses not yet offered.

Ferris State University
Program Teaching Cost 1995 - 1996 (Summer, Fall, and Winter)

Program Name: Technical Drafting and Tool Design AAS

College : Technology

Department : Manufacturing Engineering Technology

Total Program Teaching Cost (Assumes a student will complete program in one year) **$11,275.86**

Cost per SCH (Average for program) **$168.30**

Program Credits Required (Total credits to graduate) **67**

Course ID	Level	FSU's Teaching Cost	FSU's Student Credit Hours (SCH) Produced	Teaching Cost/SCH	Credits Required	Program Teaching Cost
COMM121	L	$230,660.44	2,607.00	$88.48	3.00	$265.43
CULTELE	E	$1,723,377.04	17,035.00	$101.17	3.00	$303.50
ENGL150	L	$691,277.61	6,243.00	$110.73	3.00	$332.19
ENGL250	L	$526,858.51	4,272.00	$123.33	3.00	$369.98
MATH116	L	$185,666.97	1,720.00	$107.95	4.00	$431.78
MATL240	L	$74,397.54	368.00	$202.17	4.00	$808.67
MFGT150	L	$58,797.43	276.00	$213.03	2.00	$426.07
MFGT252	L	$7,770.99	48.00	$161.90	2.00	$323.79
PHYS211	L	$119,374.03	1,572.00	$75.94	4.00	$303.75
SOCAELE	E	$1,572,854.02	19,718.00	$79.77	3.00	$239.30
TDTD111	L	$40,325.06	258.00	$156.30	6.00	$937.79
TDTD112	L	$12,952.32	138.00	$93.86	3.00	$281.57
TDTD121	L	$27,874.91	174.00	$160.20	6.00	$961.20
TDTD122	L	$10,181.08	93.00	$109.47	3.00	$328.42
TDTD211	L	$38,032.09	138.00	$275.59	6.00	$1,653.57
TDTD212	L	$20,415.60	75.00	$272.21	3.00	$816.62
TDTD221	L	$41,869.14	144.00	$290.76	6.00	$1,744.55
TDTD222	L	$20,934.57	84.00	$249.22	3.00	$747.66

Source: Office of Institutional Studies, g:\...\progcost\9596\progcost.rsl

Section 12 Conclusions

Section 12
Conclusions

Introduction

The Technical Drafting Tool Design program is celebrating its golden anniversary. It has been 50 years since the first drafting class was offered in 1947. Well over 1000 students have graduated from the program. The current degree has evolved during the last five decades. Starting with T-squares and wooden pencils to drafting machines and computers using CAD solids and parametrics.

Conclusions

Centrality to FSU mission:

The TDTD program is a design based, hands on, career oriented curriculum.

Uniqueness and visibility:

No other College or University in the state offers a program with the same title. Some institutions offer drafting programs and some offer a tooling experience but none offer the title of Technical Drafting Tool Design. Approximately 70% of our students go on for a bachelors degree in Product Design, Manufacturing Engineering, Plastics Engineering and Teacher Education.

Service to the state and nation:

The Technical Drafting Tool Design program provides a technical education with intense design training. The degree make it possible for students to obtain entry level jobs in the tool design, product design, manufacturing field and the Technical Occupational Education field. With their technical expertise, our students have made significant contributions in the design and manufacturing industry. Our students become important contributors to the future of the state and nation. Tool design plays an important part in a revitalized economy. The state and nation are dependent on the manufacturing industry to maintain a strong economy and low unemployment. The tool design industry plays a critical role in maintaining manufacturing productivity.

Demand for graduates:

The students who leave after obtaining an associate degree have found the job market to be open with many opportunities. Many students have more than one job offer in a variety of geographic locations. Salaries for two year graduates from the TDTD

program in 1995/96 are averaging $25,600 with 100% placement. Students with a TDTD degree and a bachelors degree have also found significant employment opportunities. The combination of a tool design degree with any of the four year technical degrees has attracted special interest from many employers. Four year graduates are finding the average starting salaries of approximately $35,000. Many Graduates from the TDTD program are now managing, or directing design groups and in some cases are owners of design companies. Many past graduates are now earning in excess of fifty thousand dollars per year.

Demand by students:

The program is in high demand by students. In the 96/97 school year 200 students indicated interest in the TDTD program. The TDTD advisory committee has indicated the program in doing an excellent job of instructing students. Current students have also indicated satisfaction with the program quality.

Service to non-majors:

The faculty in the TDTD program provide instruction to the majority of programs in the Manufacturing Department. The Engineering Graphics class should be part of the TDTD seniority group. The class was developed and is being taught by TDTD faculty. The course provides instruction in drawing and CAD. The TDTD 150 class is taught to Manufacturing tooling student. The PDET 322 class is taught by our faculty.

Facilities and equipment:

The TDTD facilities received a good rating. There is some problems with technical support and our printing facilities. There is concern for the program to provide quality equipment and applications. A plan to fund technical change and maintain current technology is important to the future of the program. A university program must provide instruction using equipment that is current and relevant to industry. The program must provide knowledge and skills that will be of value to industry in five to ten years.

Library information resources:

The library facilities provides technical and document assistance for the program. The library provides a liaison for our use. If technical standards or texts are needed, the staff is willing to provide their expertise and assistance in acquiring the materials. National standards and a variety of technical texts and periodicals are available for student use.

Cost:

The cost to maintain the program is minimal. The program has an S&E budget of approximately $2,000. The program generated 338 SCH for the 96/97 school year. The TDTD faculty also teach a related Etec 140 course which generated 450 SCH for 96/97.

Faculty professional and scholarly activities:

The faculty remain current and active in their industrial areas of expertise. Some faculty have worked during the summer with industry. Some faculty provide industrial training for employees and provide technical papers and workshops for industry. Faculty also participate in professional organizations and activities. Faculty continuously pursue further education and technical experiences.

Administrative effectiveness:

The faculty currently work with a faculty coordinator, assistant dean/department head, and dean of the College of Technology. The administration has been supportive of the TDTD program as illustrated by the recent development of a new TD/TD CAD lab. The faculty hope to continue a productive relationship in the future.

Section 13 Recommendations

Section 13
Recommendations

Enhance the program: The program meets or exceeds all criteria and it warrants equipment and resource allocation to maintain its quality and provide for future growth.

1. Increase recruiting efforts to increase enrollment. We had 200 perspective students for the 1996/97 school year. We feel we can improve our enrollment with the use of visitations to specific geographic locations. We would like to use multi-media methods and lap top computers with student generated graphics.

2. Increase the S&E budget to $5000 dollars. This would us to allow the TDTD program to incorporate current methods and processes into the curriculum. Funds should be made available to allow for flexibility in utilizing current technology

3. It is important for the university to establish a $30,000 capital equipment budget to replace vocational education funding that is being phased out. With the increase in technical change and information, it is critical for the program to provide students with current, relevant experiences and equipment. The program needs more computers and software, better drawing boards, a tear-down room for tool evaluation, new chairs in the computer lab and an industrial quality rapid prototyping machine. If we are going to compete with other colleges and universities it is imperative that we maintain a competitive advantage with our equipment and expertise.

4. Provide faculty development funding of $4,000/year to ensure faculty and curriculum will remain current and relevant. Faculty need advanced training to remain current with technology. Faculty also need to attend technical shows and workshops. Visits to companies inside and outside the state would also help the program. Company visits help provide job placement for students and possible equipment consignment and funds. It also gives faculty a chance to see what the real world of industry and design is doing.

Appendix

Appendix Contents

PROGRAM EVALUATION PLAN
TECHNICAL DRAFTING TOOL DESIGN PROGRAM

Degrees awarded: A.A.S. Technical Drafting Tool Design

Program Review Panel:

Co-Chairs - Mark Hill
Rick Eldridge
Program faculty - Todd Rose
Program faculty - Gary Bradt
Faculty member outside the College of Technology - Cheryl Irvine
Individual with special interest in the Program - Steve Cole
Design Division Coordinator - George Olsson

Purpose: To conduct a survey and evaluation of the Technical Drafting Tool Design Program to determine its needs and program effectiveness. The information will be used by the program to establish resource needs, future goals and outcomes. The results will also be used by the University to make informed decisions about the program and resource allocations.

Data collection Techniques:

1. Graduate surveys
2. Employer surveys
3. Student evaluation of the program and courses.
4. Faculty perceptions of the program using surveys of the program faculty and Manufacturing Engineering Faculty.
5. Advisory committee perceptions of program from a questionnaire to advisory board members.
6. Labor Market analysis information from current market indicators.
7. Evaluation of facilities and equipment by doing a review of current and future industry needs as compared to our current program equipment.
8. Curriculum evaluation information will be taken from surveys.

Program Evaluation Schedule of Events:

Activity	Leader	1997 Target Dates
Graduate Survey completed	Hill	February 15
Mailed		March 1
Employer Survey completed	Rose	February 15
Mailed		March 1
Student Survey completed	Eldridge	February 15
surveyed		March
Faculty Perceptions	Bradt	March

Advisory Committee perceptions	Eldridge	February 15
Mailed		March 1
Labor Market Analysis		March
Evaluation of Facilities	Bradt	April
Curriculum Evaluation	Hill	April

All data will be collected and evaluated during April and May with the final report written by August 1. The PRP report will be submitted September 15, 1997

Budget
Program Review
Technical Drafting & Tool Design

To: Doug Haneline Chair, Academic Program Review Committee

From: Todd Rose, Assistant Professor, Technical Drafting / Tool Design

Re: Proposed Budget for Technical Drafting / Tool Design Program Review Panel

Date: November 15, 1996

Our proposed budget for Technical Drafting & Tool Design review panel follows. Please contact me at extension 2958 if there are any questions.

Graduate / Student Survey (250)

Copy costs	$12.50
Mailing Costs	$90.00
Return Envelope Printing	$12.50
Return Mailing Costs	$90.00

Employer / Industry Survey

Copy costs	$12.50
Mailing Costs	$90.00
Return Envelope Printing	$12.50
Return Mailing Costs	$90.00

Student Support Wage

35 hours at $5.25/hr.	$183.75

Phone Expenses	$40.00
Final Document Copying Costs	$75.00
TOTAL	$708.75

Appendix H

Program Review Rating Categories

Continue the program: The program meets or exceed all criteria and the job placement is sound or the curriculum is unique in the State of Michigan. Minor modifications may be needed.

Enhance the program: The program meets or exceeds all criteria and it warrants expansion in enrollment to meet the human resources needs in the State of Michigan. A program enhancement may involve additional faculty/staff, equipment, or other resources and/or expansion in enrollment. However, such an expansion would not be initiated without the allocation of resources needed to maintain quality with an enlarged student body.

Continue the program with monitoring: Documented problem areas exist in a basically sound program that warrants continuation. The faculty and administration of the program will be monitored as to their progress in solving these problems.

Continuing the program with redirection: Significant documented problems exist within the curriculum which should be addressed. Curricular revision (redirection) in accordance with accepted University policies and procedures will be undertaken by the faculty and administration of the program. The recommendations for redirection must be submitted as a part of the final program review report.

Reduce the program: The program meets or exceeds many of the criteria, but does not claim a unique position in the State of Michigan, the job market for its graduates is diminishing, or the enrollments is declining precipitously. It should, therefore, be reduced in enrollment or resources.

Discontinue the program: Evidence suggests that the program should be terminated.

SUMMARY OF ARTICULATING SCHOOLS

SCHOOL	NUMBER OF ARTICULATED STUDENTS 1992 – 1993	1993 – 1994
Allegan Co. Area Vocational Center	6	2
Caledonia H. S.		1
Career Line Center (Ottawa ISD)	4	7
Cedar Springs H. S.		
Forest Hills Public Schools	2	
GRCCOT	5	9
G. R. Central H. S.		5
G. R. Creston H. S.	1	3
G. R. Ottawa H. S.		1
G. R. Union H. S.		
Heartlands Institute, Ionia Area	3	4
Kenowa Hills H. S.	3	1
Kent Career Technical Center	20	22
Northview H. S.	1	1
Thornapple Kellogg H. S.	3	7
Wyoming Byron Center H. S.		
Wyoming Kelloggsville H. S.		
Wyoming Lee H. S.		
Wyoming Park School		1
Wyoming Rogers H. S.		2
TOTAL	48	66

TABLE VIII CONTINUED
Placement Profile for Graduates
in the College of TECHNOLOGY
1991-92

CURRICULUM	Employed		Continuing Education				Not Seeking Employment	Seeking Employment	Unknown	TOTAL
			Ferris State		Other Instit.					
	Major Field	Not Related	Under-grad.	Grad.	Under-grad.	Grad.				
CIATE DEGREES										
rchitectural Tech	1	1	26	0	6	0	0	2	0	36
utomotive Body	10	0	7	0	0	0	0	1	6	24
utomotive Machine	8	0	6	0	1	0	0	0	2	17
utomotive Service	20	1	43	0	3	0	0	0	7	74
uilding Const Tech	8	0	22	0	1	0	0	1	3	35
onstruction Engr Tech	2	0	8	0	0	0	0	0	3	13
leavy Equipment Service	14	0	13	0	0	0	0	2	1	30
ndustrial Eltr Tech	1	1	21	0	0	0	0	0	1	24
lanufacturing Tooling Tech	12	0	7	0	0	0	0	1	0	20
lechanical Engr Tech	1	0	4	0	1	0	0	0	0	6
lastics Technology	2	1	41	0	1	0	0	0	2	47
rinting	3	1	36	0	0	0	0	5	5	50
efrig, Htg And A/C	12	0	10	0	1	0	0	0	4	27
urveying Technology	1	1	0	0	0	0	0	1	0	3
ech Dftg & Tool Design	10	1	20	0	1	0	0	0	5	37
echnical Illustration	4	1	6	0	0	0	0	2	2	15
elding Technology	4	0	13	0	1	0	0	0	2	20
TOTALS:	113	8	283	0	16	0	0	15	43	478

TABLE VIII CONTINUED
Placement Profile for Graduates
in the College of TECHNOLOGY
1992-93

CURRICULUM	Employed		Continuing Education				Not Seeking Employ.	Seeking Employ.	Unknown	TOTAL
			Ferris State		Other Instit.					
	Major Field	Not Related	Under-grad.	Grad.	Under-grad.	Grad.				
SSOCIATE DEGREES										
Architectural Tech	4	2	25	0	4	0	1	0	2	38
Automotive Body	3	2	9	0	0	0	0	0	2	16
Automotive Machine Tech	5	1	3	0	0	0	0	0	1	10
Automotive Service Tech	10	1	41	0	0	0	0	2	4	58
Building Const Tech	6	2	38	0	3	0	0	0	2	51
Construction Engr Tech	4	0	7	0	0	0	0	1	1	13
Heavy Equipment Service	22	3	20	0	0	0	0	0	4	49
Industrial Eltr Tech	3	2	16	0	0	0	0	0	3	24
Manufacturing Tooling Tech	10	0	14	0	0	0	0	2	3	29
Mechanical Engr Tech	2	1	8	0	2	0	0	1	3	17
Plastics Technology	3	0	72	0	1	0	0	0	3	79
Printing Technology	10	2	31	0	1	0	0	2	8	54
Refrig, Htg And A/C	14	0	20	0	0	0	0	0	0	34
Surveying Technology	1	1	1	0	0	0	0	1	1	5
Tech Dftg & Tool Design	7	2	29	0	0	0	0	3	3	44
Technical Illustration	4	0	2	0	0	0	0	0	0	6
Welding Technology	3	0	17	0	1	0	0	0	0	21
TOTALS:	111	19	353	0	12	0	1	12	40	548

TABLE VIII CONTINUED
Placement Profile for Graduates
in the College of TECHNOLOGY
1993-94

CURRICULUM	Employed		Continuing Education				Not Seeking Employ.	Seeking Employ.	Unknown	TOTAL
			Ferris State		Other Instit.					
	Major Field	Not Related	Under-grad.	Grad.	Under-grad.	Grad.				
ASSOCIATE DEGREES										
Architectural Tech	4	2	13	0	6	0	0	0	2	27
Automotive Body	4	0	3	0	1	0	0	2	4	14
Automotive Eng Machine Tech	2	0	0	0	0	0	0	0	0	2
Automotive Service	25	2	19	0	0	0	0	1	6	53
Building Const Tech	6	1	10	0	0	0	0	0	1	18
Civil Engineering Tech	2	0	5	0	0	0	0	0	0	7
Heavy Equipment Service	15	0	3	0	0	0	0	0	4	22
HVACR Technology	20	0	12	0	0	0	0	1	1	34
Industrial Eltr Tech	1	2	15	0	0	0	0	0	0	18
Manufacturing Tooling Tech	7	0	6	0	0	0	0	0	6	19
Mechanical Engr Tech	2	0	8	0	1	0	0	0	1	12
Plastics Technology	3	1	41	0	0	0	0	0	4	49
Printing	7	0	25	0	1	0	0	0	3	36
Surveying Technology	3	0	2	0	1	0	0	0	0	6
Tech Dftg & Tool Design	7	1	16	0	2	0	0	0	2	28
Technical Illustration	1	1	6	0	0	0	0	0	3	11
Welding Technology	2	0	6	0	0	0	0	0	2	10
TOTALS:	111	10	190	0	12	0	0	4	39	366

TABLE VIII CONTINUED
Placement Profile for Graduates
in the College of TECHNOLOGY
1994-95

CURRICULUM	Employed		Continuing Education				Not Seeking Employment	Seeking Employment	Unknown	TOTAL
			Ferris State		Other Instit.					
	Major Field	Not Related	Under-grad.	Grad.	Under-grad.	Grad.				
ASSOCIATE DEGREES										
Architectural Tech	2	1	6	0	1	0	0	0	2	12
Automotive Body 47.0603	1	0	3	0	0	0	0	0	4	8
Automotive Eng Machine Tech	1	1	3	0	1	0	0	0	3	9
Automotive Service	13	2	13	0	0	0	0	1	12	41
Building Const Tech	5	0	14	0	0	0	0	1	4	24
Civil Engineering Tech	1	1	3	0	0	0	0	0	1	6
Heavy Equipment Service	5	0	1	0	0	0	0	0	4	10
HVACR Technology	5	0	11	0	0	0	0	0	3	19
Industrial Eltr Tech	0	0	7	0	0	0	0	0	4	11
Manufacturing Tooling Tech	6	1	4	0	0	0	0	0	1	12
Mechanical Engr Tech	0	0	5	0	0	0	0	0	2	7
Plastics Technology	5	2	50	0	0	0	0	1	2	60
Printing	6	1	19	0	0	0	0	1	3	30
Surveying Technology	0	1	4	0	0	0	0	0	3	8
Tech Dftg & Tool Design	3	0	14	0	0	0	0	1	5	23
Technical Illustration	2	0	2	0	1	0	0	0	0	5
Welding Technology 48.0508	2	1	12	0	0	0	0	0	1	16
TOTALS:	57	11	171	0	3	0	0	5	54	301

Technical Drafting & Tool Design A.A.S.

Number Receiving Degrees 19

Number Responding to Survey 15 *78.9%*

		Full Time	Part Time	PT/FT Unknown
Continuing their education	14	13	1	0
Total Employed	3			
Employed in Field		3	0	0
Employed, but not in Field		0	0	0
Seeking in field	0			
Still seeking employment	0			
Not seeking employment	0			

Had an FSU Internship 2 Did their internship with the employer 2

Employment Rate *100%*

Full Time Salaries

# of grads indicating full-time employment: 3 **Did Not Answer: 0** **# Reporting: 3**

$9-11 K	$12-15 K	$16-19 K	$20-23 K	$24-27 K	$28-31 K	$32-35 K	$36-39 K	$40-43 K	$44-47 K	$48-51 K	$52-55 K	$55-60 K
			1	1	1							

Design, Manufacturing, and Graphic Arts Department

Program: Technical Drafting / Tool Design

Date: November 13, 1996

Prepared by: Todd Rose

Goal 1:	**Students will have current knowledge and skill with current technology to enter the tool design profession.**

MAJOR ACTIVITIES AND PROCESSES:

- Courses in major subjects will be offered sequentially to meet objectives.

EXPECTED OUTCOMES:

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

INDICATORS / SOURCES:

- Major course sequence will be in the form of a program check-sheet with prerequisites noted per course.

REPORTING PROCESS:

- Reviewed and approved by program faculty, advisory committee, Program Coordinator and Department Head.

RESOURCE REQUIREMENTS:

- Reallocation of existing resources and an estimated $35,000 in new funds to update CAD software and hardware (AutoCad 13 w/ Solids Modeling and Parametric Design)

Design, Manufacturing, and Graphic Arts Department

Program: Technical Drafting / Tool Design

Date: November 13, 1996

Prepared by: Todd Rose

Goal 2:	**Add faculty position for ETEC 140 classes, plus make arrangements for replacing another faculty position due to retirement.**

MAJOR ACTIVITIES AND PROCESSES:

- The Dean of Technology needs to approve adding a faculty position. This position should be filled by Fall, 1997. Another faculty member should be added before a retirement in Fall, 1998.

EXPECTED OUTCOMES:

- Better student advising
- Committed faculty to program
- Better scheduling of required courses
- Upgrading of program's professional standards

INDICATORS / SOURCES:

- Performance measures from former students, advisory committee, enrollment interest, and prospective employers.

REPORTIING PROCESS:

- Reported to Technical Drafting/Tool Design faculty members, Program Coordinator and Department Head.

RESOURCE REQUIREMENTS:

- Funds required for ETEC faculty position
- No additional funds required for retired faculty position

Design, Manufacturing, and Graphic Arts Department

Program: Technical Drafting /Tool Design

Date: November 13, 1996

Prepared by: Todd Rose

Goal 3: To maintain acceptable student recruitment/retention in TDTD.

MAJOR ACTIVITIES AND PROCESSES:

- Increase advisor/teacher contact with students and student mentoring activities.
- Increase recruiting efforts.

EXPECTED OUTCOMES:

- Obtain 100% enrollment.
- 80% of incoming class will enroll for the second year of the program.

INDICATORS / SOURCES:

- Retention rate, institutional database

REPPORTING PROCESS:

- Reviewed and discussed by program faculty, Program Coordinator, and Design, Manufacturing & Graphic Arts Department.

RESOURCE REQUIREMENTS.

- College funds of $300 required for recruiting mailers and trips to high schools.

Design, Manufacturing, and Graphic Arts Department

Program: Technical Drafting / Tool Design

Date: November 13, 1996

Prepared by: Todd Rose

Goal 4:	**Help students gain a sense of professional identity and future career opportunities.**

MAJOR ACTIVITIES AND PROCESSES:

- Students will attend professional technical meetings and research career opportunities. Field trips to selected companies for student exposure to industry practices.

EXPECTED OUTCOMES:

- Students will become aware of the many opportunities available to them - future programs at Ferris State, publications and professionals in their field of work.

INDICATORS / SOURCES:

- Sixty percent of our students will seek further schooling and become members of a professional organization related to their field of interest.

REPORTING PROCESS:

- Each faculty member will organize and direct students to different educational opportunities and professional organizations.

RESOURCE REQUIREMENTS:

- $1000 for publications and field trips.

Design, Manufacturing, and Graphic Arts Department

Program: Technical Drafting / Tool Design

Date: November 13, 1996

Prepared by: Todd Rose

Goal 5: Develop Technical Drafting / Tool Design Assessment Testing

MAJOR ACTIVITIES AND PROCESSES:

- Technical Drafting / Tool Design faculty will develop an instrument to evaluate incoming freshmen drafting knowledge and skills. A post-test to be developed to determine curriculum effectiveness.

EXPECTED OUTCOMES:

- Pre-test results will be used to measure incoming students knowledge and skill for future curriculum revisions.
- Pre-testing will be used to identify potential competency for advanced placement.
- Pre-testing results will be used to give feedback to entry level drafting programs.
- Post-test results will be used to determine effectiveness of program.
- Pre- and post-test results will be shared with industry advisory board for their input.

INDICATORS / SOURCES:

- Testing and Assessment Office will process pre- and post-test results.

REPORTING PROCESS:

- Reviewed and approved by program faculty, Program Coordinator and Department Head.

RESOURCE REQUIREMENTS:

- Clerical, Testing & Assessment Office and faculty development time.

Special Report
Technical Drafting and Tool Design Program

Mark,

Here is the information you requested for the Technical Drafting and Tool Design Program.

Enrollment	Fall 92	Fall 93	Fall 94	Fall 95	Fall 96
Pre-TDTD	0	3	2	2	4
TDTD	104	74	74	71	67

FTIAC Enr.	Fall 92	Fall 93	Fall 94	Fall 95	Fall 96
Pre-TDTD	0	3	2	2	2
TDTD	30	32	28	27	25

Degrees	1992-93	1993-94	1994-95	1995-96	1996-97
TDTD	44	28	22	19	N/A

Retention	Base	Returned After 1 Yr		Grad. at FSU in 2 Yrs		Grad. at FSU in 3 Yrs	
		#	%	#	%	#	%
Fall 92	30	21	70%	9	30%	9+4	43%
Note: 6 students received 2nd degree; 9 students still enrolled F96							
Fall 93	32	23	72%	7	22%	7+5	38%
Note: 9 students still enrolled F96							
Fall 94	28	19	68%	11	39%		
Fall 95	27	20	74%				

If you have any questions, please let me know.
Carol Maki, ext. 3801

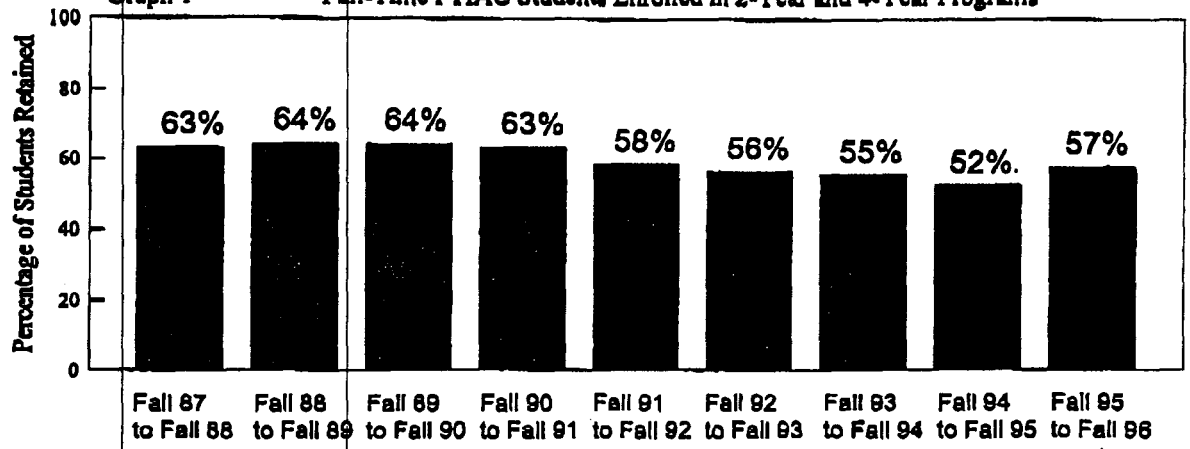
Source: Office of Institutional Studies, 6/30/97
c:\data\retgrad2\ftiacs\ .wk3

FERRIS STATE UNIVERSITY

First-Year Student Retention Rates
For Each of the Past Nine Years (Fall 1987 - Fall 1995)

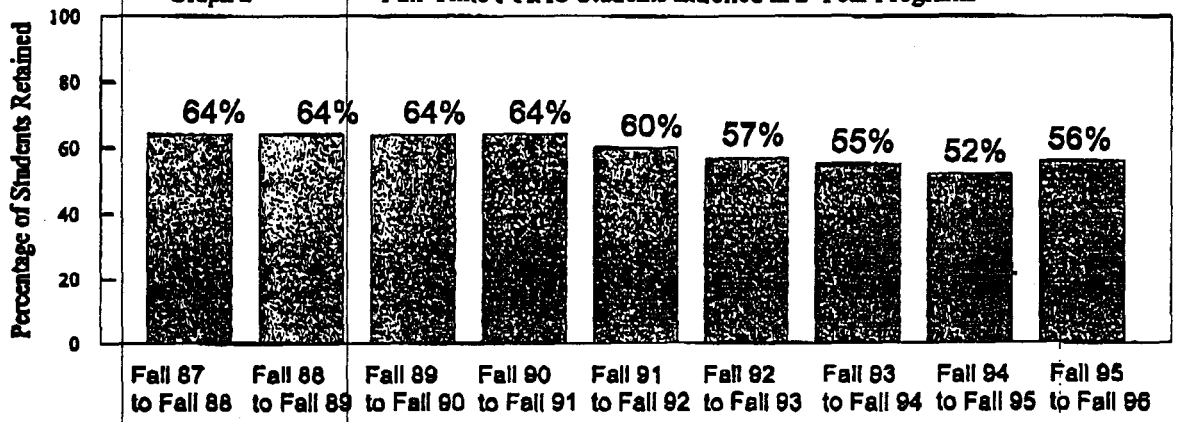
Total University

Graph 1 — Full-Time FTIAC Students Enrolled in 2-Year and 4-Year Programs



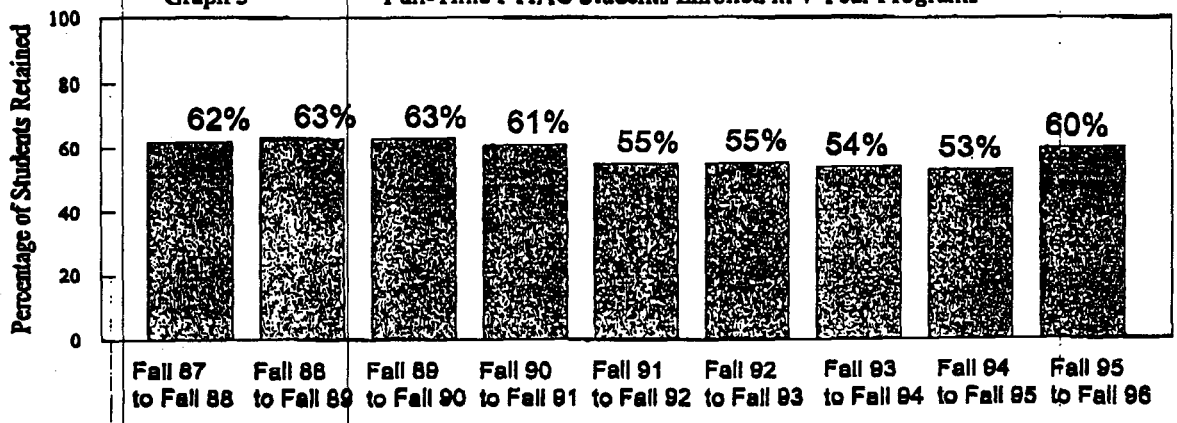
2-Year

Graph 2 — Full-Time FTIAC Students Enrolled in 2-Year Programs



4-Year

Graph 3 — Full-Time FTIAC Students Enrolled in 4-Year Programs



Source: Office of Institutional Studies, Download Data, g:\..\shared\retent\graphs\graphall, 9/9/96

Training Activities for Mark Hill
1994-1997

AitoCad R 13 Mechanical Desktop May 1997

Richard Eldridge
Assistant Professor
Faculty training

May 1997 - AutoCad 13 for windows with mechanical desktop.
May 1993 - three day die design workshop.

MARK HILL
14310 - 175th Avenue
Big Rapids, MI 49307
(616) 796-5435

EMPLOYMENT OBJECTIVE:

An academic position that would provide growth to an existing program to keep pace with industrial changes, particularly in CAD/CAM, CMM, stereolithography, design, and model prototyping, or a similar position in industry.

PERSONAL INFORMATION:

Birthdate:	10/10/51	Height:	6'
Health:	Excellent	Weight:	190 lbs.
Marital Status:	Married, two children	U.S. Citizen	

EDUCATION:

FERRIS STATE UNIVERSITY, Big Rapids, Michigan
M.S. Occupational Education, August 1988
B.S. Trade Technical Teacher Education, November 1978
Special Emphasis: Manufacturing Related
A.A.S. Technical Drafting and Tool Design, May 1977

WORK EXPERIENCE:

1978 - Present: I am an independent consultant in tool/die design, CAD, graphics, and stereolithography.

1984 - Present
FERRIS STATE UNIVERSITY, Big Rapids, Michigan
Position: CAD SPECIALIST/ASSOCIATE PROFESSOR
Major responsibilities include:

- System maintenance on ComputerVision CADDS 4x mainframe system, Cimline Tower and Power CIM Systems, and SUN Engineering workstations as well as PCs. Duties include TCP/IP networking, backups, installations, troubleshooting, conducting training sessions for faculty on changes to systems. Writing C programs and Unix shells for various applications, including DNC to machine controllers, CMM data to CAD, plotting, and printing.
- Stereolithography Manager: Install/maintain/troubleshoot SLA-250 Rapid Prototyping System. Conducted industrial training sessions on SLA applications. Have built many complex SLA models.
- Instructional duties include teaching courses in Blueprint Reading, Engineering Graphics, Drafting, Introduction to Technology, Introduction to CAD, Advanced CAD including complex surfacing, model and prototyping, FEM/FEA, and stereolithography.

12/78 - 1984
ACME INSTITUTE OF TECHNOLOGY, South Bend, Indiana
Position: DESIGN DEPARTMENT HEAD - LEAD INSTRUCTOR
Major projects and responsibilities included:

- Meeting with the Japanese Acme School periodically to inform them of text and method of operation changes.
- Initiated, organized, and conducted the selling of thee Cope System franchises to the Korean government and the Grand Rapids, Michigan and Huntsville, Alabama locations.
- Editing, rewriting and Cope System materials and informing all associate schools of the changes.
- Successfully conducted the Korean instructor training sessions.
- Established a 36-week numerical control program including basic, Manual and Compac II programming.
- Responsibilities within the classroom included teaching Tool, Die, Plastics Mold Design courses (48 weeks each). Other courses successfully taught include Algebra, Geometry, Trigonometry, Mechanical Drawing, Descriptive Geometry, Basic Computer Programming, Basic Numerical Control, Compac II, Strength of Materials, Metallurgy.

5/77 - 11/77
RAPID DESIGN SERVICE, Grand Rapids, Michigan
Duties included layout and detail of jigs, fixtures, and dies for GM, Ford, and other companies.

GENERAL INFORMATION: I enjoy most all outdoor activities, especially skiing, camping, and water sports. Member of The Society of Manufacturing Engineers.

REFERENCES: Both employment and personal references furnished upon request.

RESUME

Todd N. Rose
Phone 616 / 874-8993

PERSONAL

Birth Date:	**1-6-45**	**Married**	
Height / Weight:	**6'3" / 195**	**Children:**	**Three**
Physical Health:	**Excellent**	**U.S. Citizen**	

EDUCATION

1975 M.S. degree in Industrial Management
Western Michigan University

1968 B.S. degree in Trade Technical Education
Ferris Sate University

1965 A.A.S. degree in Technical Drafting and Tool Design
Major - Die Design
Ferris State University

1963 Graduated from Ottawa Hills High School

ADDITIONAL TRAINING

Progressive Die Design Seminar
CAD - CIMLINC, Auto-Cad, Computervision
Engineering Project Management - Westinghouse
Value Analysis - Westinghouse
Carboloy Tooling Seminar
Robotics - Unimate and GMF
Industrial Truck Design
Plant Layout and Material Handling
Electronics

PROFESSIONAL ORGANIZATIONS

Society of Manufacturing Engineers
Society of Body Engineers

PATENTS

4,719,727
4,850,176

INDUSTRIAL EXPERIENCE

1988 - Present **Associate Professor** - Manufacturing Engineering Technologies Department
Ferris State University, Big Rapids, Michigan

Major duties: Teach technical drafting, CAD (2D, 3D wire frame and surfacing) , descriptive geometry, product, tool, and die design.

Consulting Capitol Engineering, Prince Corp., Diesel Tech., Ridgeview Stamping, Precision Metalforming Association.

1982 - 1988 **Engineering Manager** - C-Tec Inc Division of Trendway Corp., Holland, Mich

Products: Access Flooring for computer rooms and offices

Major duties: Manage and direct product design / devolopment, manufacturing engineering and facilities

Major completions:
- Directed task force to relocate and start up new company
- Implemented several new product designs
- Created major cost savings through design and manufacturing
- Installed a welding robot and stacking robot

1979 - 1982 **Manufacturing Engineer** - Westinghouse Electric, Grand Rapids, Michigan

Products: Open Office Systems

Major duties: Planned and implemented plant rearrangement projects; economic justification for capital expenditures; cost reductions programs; identify, develop and recommend new method improvements. Also, planning, purchasing, and implentation of equipment for storage, work flow and material handling of raw / finished goods.

Major completions:
- Improved productivity capacity 100% on flooring product line
- Implement JIT program
- Improved quality of flooring products
- Installed major receiving / shipping converyor system
- Installed hi-rise warehousing
- In charge of product relocation to C-Tec

1969 - 1982 **Instructor** (part time) - National Apprenticeship Program
Kellogg Community College, Battle Creek, Michigan

Major Duties: Teach technical drafting, blueprint reading and tool design for apprentice tool-die, machine repair and machinists.

1976 - 1979 **Project Engineer** - Kelvinator-White Consolidated, Grand Rapids, Mich.

Products: Consumer products - electric ranges

Major duties: Managed projects - design, development and testing.

Major completions:
- Modular countertop range
- Tri-level range with microwave oven
- Glass top countertop range

1974 - 1975 **Supervisor - Tool Design** - Rockwell International, Battle Creek, Michigan

Products: Off-Highway components - brakes, special speed reducers, and mass transit units.

Major duties: Supervised plant start-up, tooling, tool design, gaging, processing and cost estimating.

Major completions:
- Plant start-up
- Design and implement disk brake caliper machining center

1971 - 1974 **Methods Engineer** - Eaton Engine Component Div., Battle Creek, Michigan

Products: Automotive and truck internal combustion engine valves

Major duties: Co-ordinate machine set-ups, improve production methods, economic justification for capital equipment purchases, tooling justification and procurement, work standards and design.

Major completion:
- Design machine to combine five machining operations into one.

1968 - 1971 **Designer Draftsman** - Clark Equipment Co., Battle Creek, Michigan

Products: Industrial fork-lift trucks

Major duties: Design, development, testing, proto-type, tooling and production follow-up for electric fork- lift trucks.

Major completion:
- Development of new 6000-8000 lb. electric rider trucks

1966 - 1967 **Die Designer** - Kirsch Company , Sturgis, Michigan

Products: Drapery Hardware

Major duties: Design progressive dies for drapery hardware

Resume

Richard Frank Eldridge

14359 175th Ave
Big Rapids, Michigan 49307
Phone: W: (616) 592-2957
H: (616) 7963346

Professional Experience

December 1986 to Present

Ferris State University
Big Rapids, Michigan

Assistant Professor Technical Drafting Tool Design Program Developed outlines and syllabi for the first year of the program. Currently teach classes in the first year of the program. Taught die design and tool design in the second year of the program. Incorporated geometric dimensioning and tolerancing into the tool design class.

Dec. 1986 to Aug. 1977

Keiper Recaro Inc.

Battle Creek, Michigan

Project Manager

Duties included design of automotive seat recliners. detailing of components, creating assemblies, Prototype evaluation, testing, customer approval and validation. Worked with vendors to insure part quality and reliability. Worked with General Motors, Chrysler and the Van Conversion industry. Projects required teamwork and working with others in the engineering group and production area.

Aug. 1974 to June. 1977

Westminster High School

Westminster, Colorado

Taught woodworking, electronics and automotive classes at Westminster High School. Developed and taught a small engines class while there.

Aug. 1970 to Aug. 1972

Nation Electronics Institute

Denver, Colorado

Taught drafting at the private vocational school for two years. Major areas taught were drafting, descriptive geometry, illustration, electronic layout of circuit boards.

June. 1964 to Aug. 1965

Kellogg Company

Battle Creek, Mi.

Detailed Machine parts for the tool room. Components were for food processing equipment.

Education

Aug.1962 to Dec. 1965

Kellogg Community College
Associate in Applied Science
Drafting

Aug. 1972 to June 1974

University of Northern Colorado
Bachelor of Arts
Industrial Arts Education

Aug. 1987 to Aug. 1992

Ferris State University
Masters
Occupational Education
Graduated with honors

Miscellaneous Educational Activities

Member of the College Curriculum Committee
Member Department Curriculum Committee
Chair Department Tenure Committee
Attended AutoCAD 13 with Mechanical Desktop training
Attended Rapid Prototyping workshops
Attended Die Design Workshop
Taught Monday Night Technology classes for local ISD
Provided training in GD&T for local industry
Provided blueprint reading for Diesel Technology employees
Helped with SME student chapter
Member of SME
Worked on Auto Steel activities
Worked with summer student orientation

ADMINISTRATIVE PROGRAM REVIEW

Program/Department: Pre-Technical Drafting / Technical Drafting and Tool Design / MFGE

Date Submitted: November 27, 1995 Dean: L. Keys

Please provide the following information:

Enrollment/Personnel

	Fall 1992	Fall 1993	Fall 1994	Fall 1995	Fall 1996
Tenure Track FTE		4.14	3.77		
Overload/Supplemental FTEF					
Adjunct/Clinical FTEF (unpaid)					
Enrollment on-campus Total*	0/104	3/74	2/71	2/71	
Freshman	0/46	3/41	2/35	2/41	
Sophomore	0/44	0/23	0/34	0/24	
Junior	0/9	0/7	0/2	0/5	
Senior	0/5	0/3	0/3	0/1	
Masters					
Doctoral					
Enrollment off-campus*		0	0	0	

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

Financial

Expenditures	FY91	FY92	FY93	FY94	FY95
Supply & Expense	$6,186	$5,759	$5,158	$4,939	$6,714
Equipment					
Gifts & Grants	N/A	N/A	N/A	N/A	N/A

*Use end of fiscal year expenditures.

Other

	AY 90-91	AY 91-92	AY 92-93	AY 93-94	AY 94-95
Number of Graduates * - Total	18	37	44	28	
- On campus	18	37	44	28	
-Off campus	0	0	0	0	
Placement of Graduates	16	32	38	26	
Average Salary	N/A	19,233	N/A	N/A	
Productivity-Academic Year Average				328	340
-Summer				0	0
Summer Enrollment	0/9	0/8	N/A	1/4	1/5

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

1.a. Areas of strengths: (Technical Drafting / Tool Design)

- Traditional engineering technology field
- Large freshmen draw
- Good feeder for B.S. programs
- High application of computer technology
- High industrial demand for graduates

1.b. Areas of concern:

- Limited faculty resources
- FSU's ability to provide high platform technology
- Faculty development

2. Future goals (please give time frame):

- Add a full-time tenure track faculty member by Fall 96
- Review high platform workstations 96/97
- Research B.S. program concept 96/97

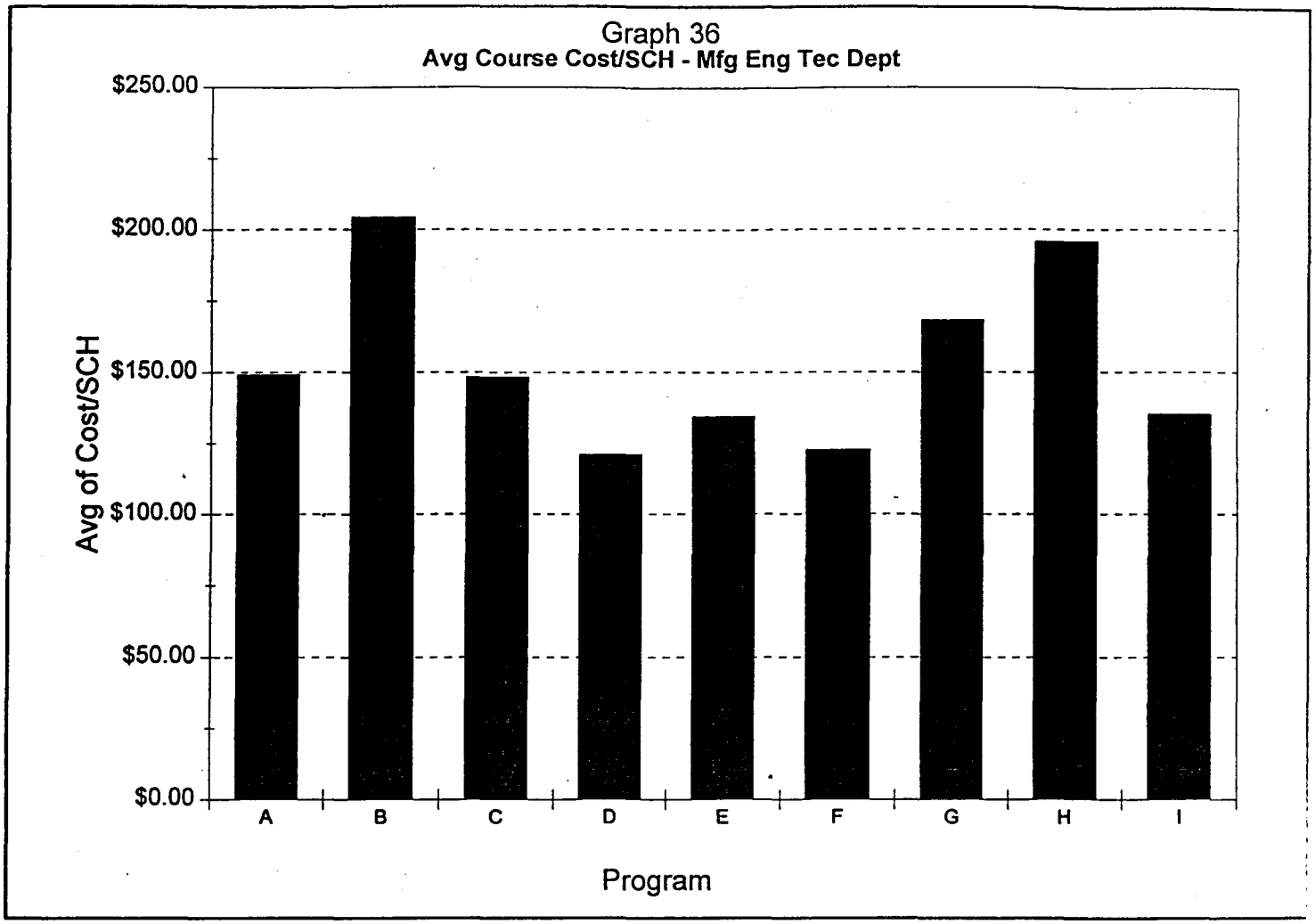
3. Recommendations:

- Continue to support the program
- Recruit and accept students

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

Average Course Cost/SCH - Programs in the Manufacturing Engineer Tech Dept
1995 - 1996 Data



A	Manufacturing Engineering Technology BS (Yrs 3&4)	$149.17
B	Manufacturing Tooling Technology AAS	$204.42
C	Mechanical Engineering Technology AAS	$148.40
D	Plastics Engineering Technology BS (Yrs 3 & 4)	$121.09
E	Plastics Technology AAS	$134.35
F	Product Design Engineering Technology BS (Yrs 3&4)	$122.76
G	Technical Drafting and Tool Design AAS	$168.30
H	Welding Engineering Technology BS (Yrs 3&4)	$195.84
I	Welding Technology AAS	$135.28

Source: Office of Institutional Studies, g:\...\progcost\9596\avgP7me.rsl

Table I

Alpha Listing of Program Teaching Costs per Student Credit Hours 1995-1996 Data

(Teaching Costs Include Fringes)

Program Name and Degree	Credit Hours	Total Teaching Cost	Total Teaching Cost / Cr Hrs
Real Estate AAS	62	$7,187.89	$115.93
Real Estate Certificate	30	$3,984.57	$132.82
Recreation Leadership & Mgt/Aquatic Track BS	128	$13,413.15	$104.79
Recreation Leadership & Mgt/Corp Fitness-Well Track BS	128	$12,486.58	$97.55
Recreation Leadership & Mgt/Leisure Service Track BS	128	$13,452.26	$105.10
Recreation Leadership & Mgt/Outdoor-Adv Edu Track BS	128	$13,224.60	$103.32
Respiratory Care AAS	69	$5,820.13	$84.35
Retailing AAS	67	$7,382.76	$110.19
Retailing BS	127	$14,906.13	$117.37
Small Business Management BS	123	$12,746.44	$103.63
Social Work BSW	128	$14,930.54	$116.64
Surveying Engineering BS	138	$19,031.75	$137.91
Surveying Technology AAS	61	$7,810.24	$128.04
Technical and Professional Communication BS	124	$17,393.56	$140.27
Technical Drafting and Tool Design AAS	67	$11,275.86	$168.30
Technical Education, BS (Yrs 3 & 4)	103	$34,265.52	$332.67
Television Production BS	129	$16,256.29	$126.02
Training in Business and Industry BS (Yrs 3 & 4)	100	$15,597.70	$155.98
Vision Science BS (Yrs 3 & 4)	82	$18,662.37	$227.59
Visual Communication AAS	66	$8,250.76	$125.01
Visual Communication BS	130	$19,206.08	$147.74
Wage Earning Home Economics Education BS	135	$38,680.16	$286.52

Source: Office of Institutional Studies, g:\...\progcost\9596\alphaprg.rsl

Table II

Program Teaching Costs per Student Credit Hours Ranked High to Low
1995-1996 Data
(Teaching Costs Include Fringes)

Program Name and Degree	Credit Hours	Total Teaching Cost	Total Teaching Cost / Cr Hrs
Electrical/Electronics Engr Technology BS (Yrs 3 & 4)	70	$12,335.40	$176.22
International Business Certificate	12	$2,111.53	$175.96
Technical Drafting and Tool Design AAS	67	$11,275.86	$168.30
Heavy Equipment Service Eng Tech/Mfg Opt BS(Yrs 3&4)	65	$10,624.84	$163.46
Heavy Equipment Technology AAS	67	$10,876.11	$162.33
HVACR Technology AAS	68	$10,955.29	$161.11
Career and Tech Educ/Administrative Cert MS	32	$5,142.52	$160.70
Architectural Technology AAS	66	$10,446.74	$158.28
Heavy Equipment Service Eng Tech/Maint Opt BS(Yrs 3&4)	66	$10,412.30	$157.76
Industrial Electronics Technology AAS	66	$10,383.91	$157.33
Training in Business and Industry BS (Yrs 3 & 4)	100	$15,597.70	$155.98
Actuarial Science BS	120	$18,694.23	$155.79
Printing Management BS (Yrs 3 & 4)	64	$9,889.89	$154.53
Career and Tech Educ/Career & Tech Instr MS	32	$4,844.52	$151.39
Career and Tech Educ/Human Resource Dev MS	31	$4,680.41	$150.98
Manufacturing Engineering Technology BS (Yrs 3&4)	79	$11,784.23	$149.17
Mechanical Engineering Technology AAS	68	$10,091.29	$148.40
Visual Communication BS	130	$19,206.08	$147.74
Legal Assistant AAS	64	$9,413.36	$147.08
Automotive Body AAS	63	$9,189.41	$145.86
Nursing AAS	72	$10,495.87	$145.78
Facilities Management BS (Yrs 3 & 4)	67	$9,679.08	$144.46

Source: Office of Institutional Studies, g:\...\progcost\9596\rankprg.rsl

Table VI

Teaching Cost per Student Credit Hour by Course - Ranked High to Low Cost Calculated by Pooled Course Prefix 1995-1996 Data

(Teaching costs Include Fringe)

Course Prefix	Course Description	Teaching Cost Per Credit Hour
PHCC	Elective	$1,232.01
OPHT	Opticianry	$413.21
TCOM	Technical and Professional Communication	$345.85
DTEC	Dental Technology	$328.36
CISM	Computer Information Systems Management	$313.85
PTEC	Printing Technology	$276.32
HSET	Heavy Equipment Service Engineering Technology	$271.38
OPTM	Optometry	$269.62
PHRM	Elective	$266.25
LLAW	Law	$231.18
ISMM	Elective	$230.82
PMGT	Printing Management	$225.33
COMG	Elective	$219.22
AUTO	Automotive Service Technology	$218.16
INCT	Industrial Chemistry Technology	$212.55
MFGT	Manufacturing Tooling Technology	$208.46
CETM	Civil Engineering Technology	$207.13
ARCT	Elective	$204.84
INSR	Insurance	$203.78
FMAN	Facilities Management	$202.01
WELD	Welding Engineering Technology	$200.53
BCTM	Building Construction	$196.49
MATL	Metallurgy	$195.42
TDTD	Technical Drafting and Tool Design	$193.30
ARCH	Architectural Technology	$190.53
ACCM	Elective	$186.55
HEQT	Heavy Equipment Technology	$179.81
MSMK	Elective	$179.48
PHPR	Pharmacy Practice	$177.97