PRODUCT DESIGN ENGINEERING TECHNOLOGY

BACHELOR OF SCIENCE PROGRAM

SELF STUDY

FOR

ACADEMIC PROGRAM REVIEW

Ferris State University
College of Technology
Mechanical Design Department

August 2006

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SECTION 1

PROGRAM OVERVIEW

A. PROGRAM GOALS

The mission of Ferris State University is to be a national leader in providing opportunities for innovative teaching and learning in career oriented, technological and professional education. Consistent with the mission of the University, the Product Design Engineering Technology program has the objective of providing a comprehensive education in mechanical design equal to the demands of today's industrial environment while preparing the graduate for the technical challenges of tomorrow's workplace. The goals of the program were established by the program faculty and the College of Technology administration at its inception in 1988. The goals were first articulated and remain unchanged from those expressed in the 2000 Academic Program Review.

B. PROGRAM VISIBILITY AND DISTINCTIVENESS

The Product Design Engineering Technology (PDET) program at Ferris State University was developed to provide a two year Bachelor of Science degree path for students already possessing a two year Associates degree in certain specific areas related to mechanical design and/or manufacturing. The program enrolled its first students in the fall of 1988. These students later became the first graduating class in May 1990. Shortly after the introduction of the program on campus in Big Rapids, the program was offered in a three year evening format at the Applied Technology Center in Grand Rapids. The off campus program was an immediate success as a path to career development among working industrial designers in the West Michigan area.

The PDET program is unique on several levels. It is one of the few remaining programs offered by the College of Technology at the Applied Technology Center in Grand Rapids. It is exceptionally transfer friendly in that it provides equal opportunity for prospective students to complete admission requirements at any community college as easily as those students who enter the program from an on-campus two year degree program. In many cases, the PDET program provides the only feasible path to a BS degree for graduates of two year, Associates of Applied Science (AAS) programs. Because of its more open admission requirements, acceptance into the program is competitive and rigorous adherence to admission standards is maintained.

The program curriculum is unique in that it includes technical content necessary for the engineering analysis required for mechanical design and couples this knowledge with other content necessary to develop products rather than components. It is this blending of engineering science and areas such as intellectual property legal aspects, ergonomics and formal technical communications that has no direct parallel to any other program in Michigan or (with few exceptions) nationally. The most applicable program for comparison purposes can be found at Stanford University which offers both BS and MS degree programs in Product Design as part of its Mechanical Engineering Department. In 2004, a Product Design faculty representative traveled to Palo Alto, CA and conducted an on-site review of the Stanford program, establishing a professional dialog between the two programs that continues today. The need for studio space for student projects was identified as a PDET program need because of this dialog.

The central problem area for the PDET program is its lack of visibility. Other than the students already enrolled in College of Technology programs, most potential students only discover the existence of the program by personal referral or by chance. Even when aware of the program, adequate information to make an application decision and to make personal contact with program faculty is difficult to find. For this reason of the five largest Michigan community colleges (Macomb, Oakland, Schoolcraft, Lansing and Wayne), only Lansing Community College has had a significant record of transfer to the PDET program. Program visibility has also been compromised by the development of off-campus programming such as the

Bachelor of Applied Science (BAS) in Industrial Technology and Management which is promoted locally, diverting interest in transfer programs such as PDET.

C. PROGRAM RELEVANCE

Employment opportunities for Product Design program graduates can be evaluated on both a state and national basis. A problem area in the analysis of employment trends for Product Design graduates, however, is a difficulty in the selection of the correct statistical base. The profession of designing new products is typically reported in multiple categories. The most applicable categories determined from national and state employment databases are typically;

> Mechanical Engineers – B.S. degree in Mechanical Engineering. Primarily concerned with the technical aspects of mechanical design and manufacturability.[1]
>
> Industrial Designers – Normally a B.F.A. degree. Concerned primarily with product appearance and functionality.[2]

The Product Design program at Ferris State is a hybrid of the training required for these specialties. The program has less analytical content than a B.S. in Mechanical Engineering and much less art content than typical of Industrial Design. This unique nature of the Product Design program therefore requires evaluating at least these two skill categories of labor market data. Analysis was done on both the state and national level for these categories and a reasonable outlook for PDET graduates would approximate the collective projections for these categories.

The US Dept. of Labor, Bureau of Labor Statistics (BLS) predicts employment opportunities for both Mechanical Engineers and Industrial Designers to be 'as fast as average' relative to other professions through 2014. Further definition provided by the BLS defines this to an annual growth rate of 9-17%. Annual salary on a national level for these categories for May 2004 is estimated to be;

SOC Code	BLS Title	Median Annual Salary
172141	Mechanical Engineers	$66,320
271021	Commercial & Industrial Designers	$52,310

A source of inaccuracy in this information is that this category includes all levels of experience and levels of education. These values therefore are higher than would be reasonable to expect for a new PDET program graduate with little or no professional experience. To see this effect, the BLS offers the results of a 2005 survey by the National Association of Colleges and Employers that found the average annual salary for BS Mechanical Engineering Graduates was $50,236. In addition to this information a Penton Media survey for all engineers completed in 2005 indicated an average annual survey of $49,000 for engineers surveyed (including primarily mechanical engineers) with less that 3 years of experience.[3] These results are reasonably consistent with the average starting salary for PDET program graduates determined by Ferris State Career Services (see Section 3, Figure 3.1).

Since program history indicates that most Product Design program graduates remain in the State of Michigan, their market demand can be best estimated using the regionalized data provided by the Michigan Department of Labor and Economic Growth. A summary of the employment opportunity projections for the two categories evaluated shows;

SOC	BLS Title	2002	2012	% Change	Annual Openings
172141	Mechanical Engineers	15928	17438	+9.5%	587
271021	Commercial & Industrial Designers	7484	8350	+11.6	187

[1] For an expanded description of the Mechanical Engineer category see Appendix A.
[2] For an expanded description of the Industrial Designer category see Appendix A.
[3] See http://www.machinedesign.com

The Michigan Department of Labor and Economic Growth, while acknowledging a dramatic decrease in Michigan manufacturing, has also designated both Mechanical Engineering and Designers as Critical Occupations for the state. This is explained by the following statement (referring to Mechanical Engineers) from the BLS;

> *Although total employment in manufacturing industries—in which employment of mechanical engineers is concentrated—is expected to decline, employment of mechanical engineers in manufacturing should increase as the demand for improved machinery and machine tools grows and as industrial machinery and processes become increasingly complex. Also, emerging technologies in biotechnology, materials science, and nanotechnology will create new job opportunities for mechanical engineers. Additional opportunities for mechanical engineers will arise because the skills acquired through earning a degree in mechanical engineering often can be applied in other engineering specialties.*[4]

The PDET program has remained well connected with the Michigan employment base for its graduates. It was feedback from industry and program graduates that was the impetus that introduced solid modeling software into the program in 2001. The program's industrial advisory committee (IAC) and PDET students were also consulted in making the decision to implement mandatory notebook computer ownership for the program. Input from program alumni was also responsible for adding a design review element into the capstone project. Suggestions from industrial reviewers and the IAC regarding the need to improve communication skills resulted in the inclusion of both ENGL 321 and COMM 336 courses in the curriculum.

Students generally decide to pursue Product Design at Ferris State for various reasons. Some students choose PDET because it offers them the opportunity to experience the entire design process from research through analysis and project management. Many students arriving from two year drafting related programs have chosen the program because they can use their prior educational experience to good advantage in the program. Students that have a more general two year background select PDET because it offers them the opportunity to enter the mechanical design field based on pre-admission requirements that match a variety of academic backgrounds. All transfer students to the program benefit by having nearly all of their completed credits transfer. Off-campus students often choose Product Design over other more general credentialing degree programs because they realize that PDET program coursework can be immediately applied in their current employment.

Analysis of student sentiment and course feedback is accommodated using a variety of methods that extend well beyond the university's standard Student Assessment of Instruction (SAI) evaluations. The following courses all include special assessments of student competencies as well as student sentiment. These provide a student feedback mechanism for each semester of the program.

PDET 312	Geometric Dimensioning and Tolerancing	Fall 3rd year
PDET 322	Solid Modeling CAD	Winter 3rd year
PDET 415	Advanced Solid Modeling	Fall 4th year
PDET 499	Senior Project / Capstone	Winter 4th year

The student and alumni surveys presented in Sections 2A and 2C & 2D of this report indicate an overall high level of satisfaction with the Product Design program. Most students comment on the program's relevance in the contemporary workplace and the application orientation of program courses. In general new graduates have found that the program provides a sound foundation for a professional career in mechanical design related professions. Alumni several years removed from the program generally identify the communication and project management elements of the program as important to their long term success.

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[4] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2006-07 Edition*, Mechanical Engineers, on the Internet at **http://www.bls.gov/oco/ocos290.htm** (visited *June 21, 2006*).

D. PROGRAM VALUE

The Product Design Engineering Technology program is an educational program that provides relevant content leading to a credential of value (the BS PDET) in a timely manner. In addition to this fundamental benefit to program students, the program is a source of transfer students, increasing university enrollment and providing headcount vital to the efficient operation of many supporting departments and programs. Critically important is that the Product Design program provides this service to the university while utilizing a minimum of resources (two faculty members and one classroom).

The benefits of the program to employers are reflected in the starting salary and placement rate of program graduates. Of 170 degree programs at Ferris State, the Product Design program ranks 6th in terms of starting salary and has enjoyed a high sustained placement rate for its graduates. The value of the program is recognized by both program faculty (see Section 2E) and its Industrial Advisory Committee (see Section 2F).

The Product Design program provides significant service to other programs within the College of Technology. Program faculty have developed new courses for other programs and initiated several joint activities to integrate the operation the program with of other college programs. The PDET program funds all licensing costs for the industry standard solid modeling software shared with the Manufacturing and Mechanical degree programs. Program faculty have served on a variety of department, college and university committees. In addition program faculty are involved in a variety of professional organizations with the individual faculty member funding membership expenses. The Product Design program considers the education and support of its students to be of paramount importance. For this reason both program faculty members have a heavy teaching load and schedule development activities at times that do not impact class activities. This commitment to the efficient delivery of maximum, relevant, instructional content is a remarkable characteristic of the Product Design Engineering Technology program.

SECTION 2 A

COLLECTION OF PERCEPTIONS - GRADUATE FOLLOW-UP SURVEY

To learn the perceptions and experiences regarding employment based Product Design Engineering Technology program outcomes, a survey instrument was developed to evaluate targeted areas. The survey instrument, titled *Alumni Survey,* is provided in Appendix B. The survey was developed by FSU Institutional Testing and Research in conjunction with program faculty. This survey was sent to all program graduates and included both on-campus and off-campus program alumni. At total of 374 surveys were mailed to graduates using address information provided by the Ferris Alumni Services. Each survey was sent with an introductory letter and a self-addressed return envelope. After a five week period 93 of 374 responses (29.4%) were received and 25 surveys (6.7%) had been returned with incorrect addressing.[1] There were 26 response items included in the survey with five questions requiring qualitative responses and seven questions requesting descriptive information regarding the alumni respondent. The quantitative responses were evaluated using parametric and non-parametric statistics as appropriate and examples of representative qualitative responses were selected from those provided.

Questions 1, 2, 3, 4, 6 and 7 were descriptive in nature and are not analyzed in this report.

Q5 – Question 5. This question asked the respondent to define the year that they graduated from the Product Design program. Although descriptive in nature, the year that the respondent graduated from the program is important in evaluating other question responses and is therefore included.

Graduation Year

		Frequency	Percent	Valid Percent	Cumulative Percent
	1990	1	1.1	1.1	1.1
	1991	1	1.1	1.1	2.2
	1992	6	6.5	6.6	8.8
	1993	6	6.5	6.6	15.4
	1994	2	2.2	2.2	17.6
	1995	8	8.6	8.8	26.4
	1996	6	6.5	6.6	33.0
	1997	6	6.5	6.6	39.6
	1998	10	10.8	11.0	50.5
	1999	6	6.5	6.6	57.1
	2000	3	3.2	3.3	60.4
	2001	6	6.5	6.6	67.0
	2002	7	7.5	7.7	74.7
	2003	10	10.8	11.0	85.7
	2004	4	4.3	4.4	90.1
	2005	9	9.7	9.9	100.0
	Total	91	97.8	100.0	
Missing	System	2	2.2		
Total		93	100.0		

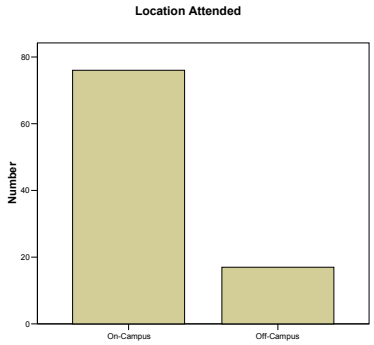
Analysis; Reponses indicated that all class years (1990 through 2000) were represented. Class years 1998 and 2003 had the largest number (10) of respondents and class years 1990 and 1991 had the smallest number of respondents (1).

[1] The previous PDET alumni survey (2000) had a 39% response rate.

Q8 – Question 8. This question asked the respondent to identify whether they were an on-campus or off-campus student.

Location Attended

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	On-Campus	76	81.7	81.7	81.7
	Off-Campus	17	18.3	18.3	100.0
	Total	93	100.0	100.0	

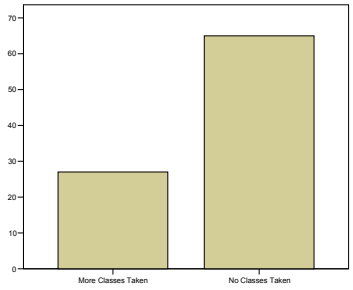


Analysis; Most responding students (76%) attended classes as on-campus students in Big Rapids. This response reflects approximately the same proportion as the surveys mailed.

Q9 – Question 9. This question asked the respondent to indicate if they had attended any college level classes after graduating from the program.

College After PDET Graduation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	More Classes Taken	27	29.0	29.3	29.3
	No Classes Taken	65	69.9	70.7	100.0
	Total	92	98.9	100.0	
Missing	System	1	1.1		
Total		93	100.0		



Analysis; The survey indicated that 27 responding students (29%) had continued their college level education after graduating from the Product Design program.

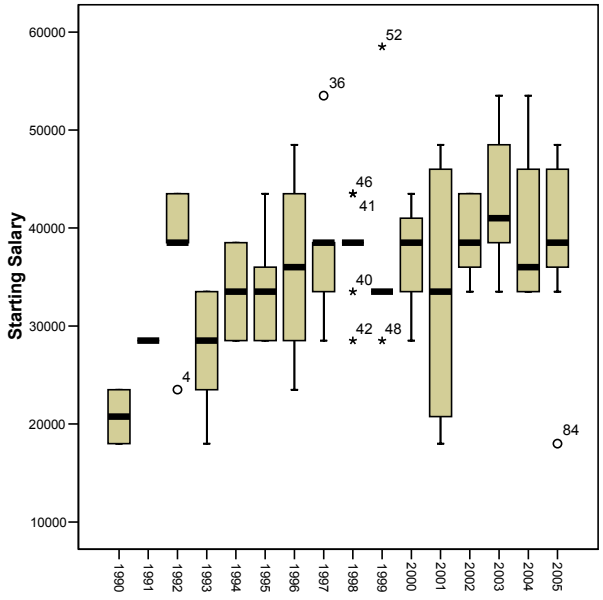
Q10 – Question 10. This question asked the respondent to indicate where and what they studied after graduating from the program.

Analysis; There were 31 responses to this question. In most cases, the responses obtained for this question indicated that the classes taken were part of a graduate degree program with Grand Valley and Western Michigan the most common schools identified. See Appendix B for all responses to this question.

Q11 & Q12 – Question 11 and Question 12. These questions asked the respondent to indicate their approximate annual starting salary in dollars after graduating from the program (Q11) and their current salary (Q12). Responses to this question were reported by asking the respondent to select their approximate starting salary from a selection of 14 dollar brackets with the results as follows;

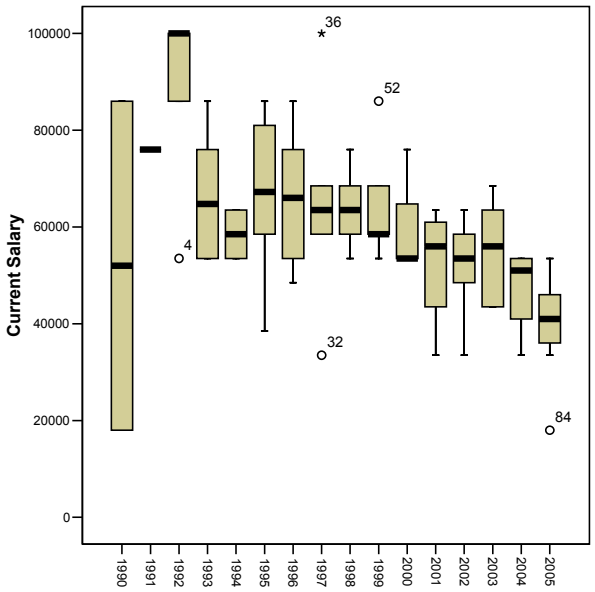
Starting Salary

		Responses	Percent
Salary	15-20,999	5	5.4
	21-25,999	5	5.4
	26-30,999	13	14.0
	31-35,999	17	18.3
	36-40,999	23	24.7
	41-45,999	15	16.1
	46-50,999	5	5.4
	51-55,999	4	4.3
	56-60,999	1	1.1
	Total	86	92.5



Current Salary

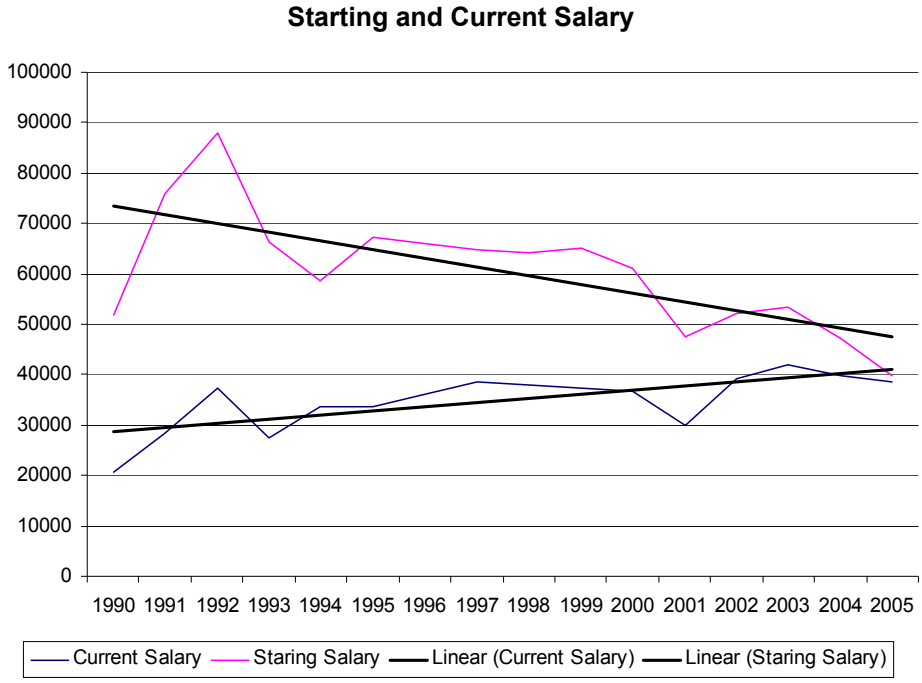
		Responses	Percent
Salary	15-20,999	2	2.2
	26-30,999	1	1.1
	31-35,999	5	5.4
	36-40,999	3	3.2
	41-45,999	5	5.4
	46-50,999	6	6.5
	51-55,999	18	19.4
	56-60,999	11	11.8
	61-65,999	8	8.6
	66-70,999	7	7.5
	71-80,999	9	9.7
	81-90,999	7	7.5
	100,000 or more	4	4.3
	Total	86	92.5



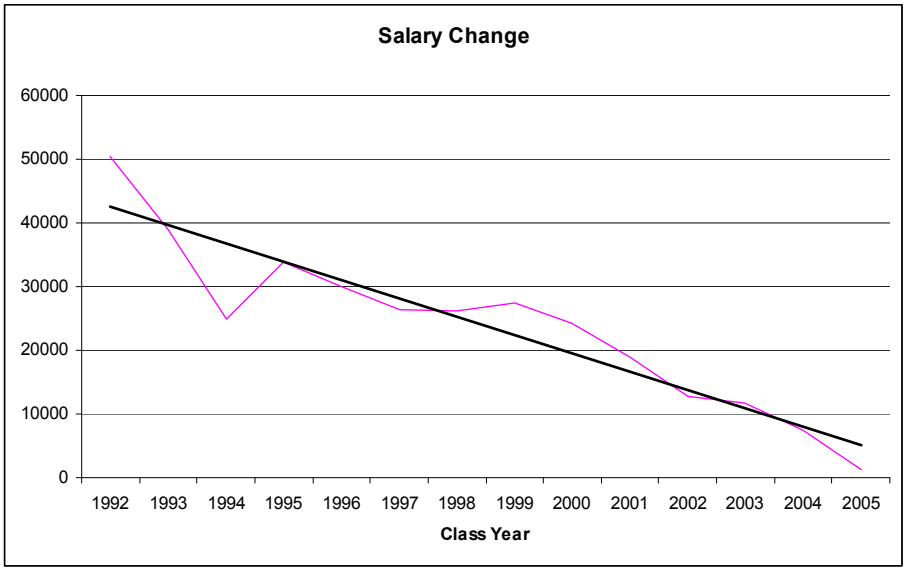
To further clarify, the salary information was then evaluated by graduation year. In addition the salary brackets were replaced by median dollar values (i.e. a 15-20,999 response was replaced by $18,000). This information was then used to calculate an average starting and current annual salary. These values were in turn used to calculate the change in salary (current – starting) and the percent change in salary since graduation. These values are reflected in the following table.[2]

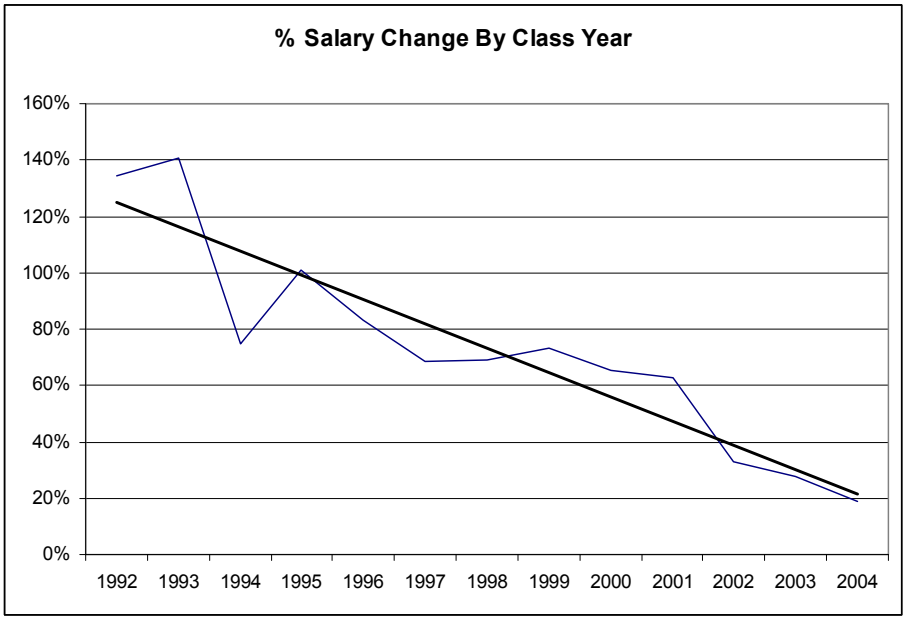
Year	1990	1991	1992	1993	1994	1995	1996	1997
Starting Average	20750	28500	37500	27583	33500	33500	36000	38500
Current Average	52000	76000	87900	66417	58500	67250	66000	64800
Average Change			50400	38833	25000	33750	30000	26300
% Change			134%	141%	75%	101%	83%	68%
Responses	2	1	5	6	2	8	6	5

Year	1998	1999	2000	2001	2002	2003	2004	2005
Starting Average	37944	37500	36833	30000	39214	41833	39750	38438
Current Average	64056	65000	61000	47500	52071	53500	47250	39688
Average Change	26111	27500	24167	18875	12857	11667	7500	1250
% Change	69%	73%	66%	63%	33%	28%	19%	3%
Responses	9	6	3	6	7	10	4	8



[2] Because of the small number of respondents, change in salary was not evaluated for the 1990 and 1991 class years.



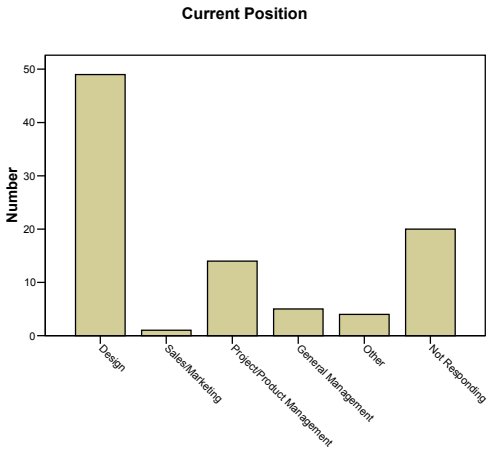


Analysis; Survey results indicate that the 86 responding graduates have experienced an employment market that has experienced continued growth in starting salary at or above the rate of inflation. In addition the analysis shows a high level of salary growth for PDET graduates with graduates reporting an approximate 8% growth in annual salary relative to their starting salary and graduation year. It also should be noted that there is some difference between the reported starting salaries reported as part of this study and the starting salaries reported to the Career Services office (see Section 3, Figure 3.1).

Q13 – Question 13. This question asked the respondent to describe their current position.

Current Position

	Frequency	Percent	Valid Percent	Cumulative Percent
Design	49	52.7	52.7	52.7
Sales/Marketing	1	1.1	1.1	53.8
Project/Product Management	14	15.1	15.1	68.8
General Managemen	5	5.4	5.4	74.2
Other	4	4.3	4.3	78.5
Not Responding	20	21.5	21.5	100.0
Total	93	100.0	100.0	



Analysis; Most responding program graduates are currently in a position associated with design (52.7%). Positions in Project/Product Management were reported by a lower number of respondents (14%). This indicates that most graduates are currently employed in positions related to their academic background in the Product Design program.

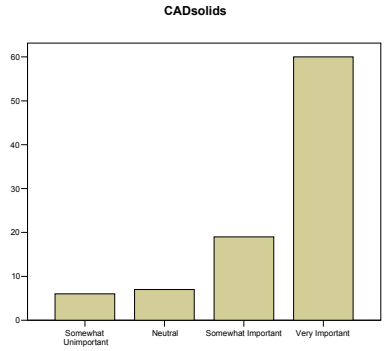
Q14 – Question 14. This question asked the respondents to evaluate the relative importance of the major course/skill areas of the Product Design Engineering Technology academic program based on their experience since graduation. For this question the respondent was asked to provide a Likert scaled response for each of 17 subject areas applicable to the PDET curriculum. Responses were coded on a 1 to 5 scale, with 5 designated as 'Very Important', 4 as 'Somewhat Important', 3 as a neutral response, 2 as 'Somewhat Unimportant' and 1 as 'Very Unimportant'. To identify the courses with the most extreme evaluations the mean response value for each subject area was calculated. Using this information, reflected in the following table, the courses with the highest (highest mean score) and lowest (lowest mean score) perceived value were determined.

	Responses	Minimum	Maximum	Mean
AdvGDandT	93	1	5	3.87
StaticStren	93	1	5	**4.26**
Electronics	93	1	5	3.33
Art	93	1	5	**2.66**
Dynamics	92	1	5	4.01
Ergonomics	92	1	5	3.70
PlasticMTL	93	1	5	**4.26**
AppCalc	93	1	5	**2.99**
MachineDes	91	1	5	4.20
Psyc	92	1	5	**2.76**
Thermo	93	1	5	3.60
MetalsMTL	93	1	5	4.20
AdvComp	92	1	5	3.71
TechPreso	91	1	5	4.18
FEA	92	1	5	3.92
CADsolids	92	2	5	**4.45**
SrProject	91	1	5	**4.29**

Analysis; The subject areas with the highest perceived value were Solid Modeling CAD (4.45) and the Senior Project (4.29). The subject areas with the lowest perceived value to program graduates were Art (2.66), Psychology (2.76) and Applied Calculus (2.99). More detail was developed for each of these courses with exceptional ratings and is presented in the following summaries.

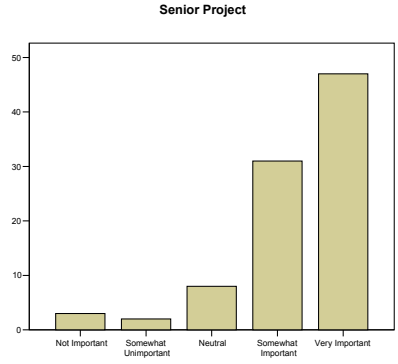
CAD Solid Modelling

	Frequency	Percent	Valid Percent	Cumulative Percent
Somewhat Unimportant	6	6.5	6.5	6.5
Neutral	7	7.5	7.6	14.1
Somewhat Important	19	20.4	20.7	34.8
Very Important	60	64.5	65.2	100.0
Total	92	98.9	100.0	
No Response	1	1.1		
Total	93	100.0		



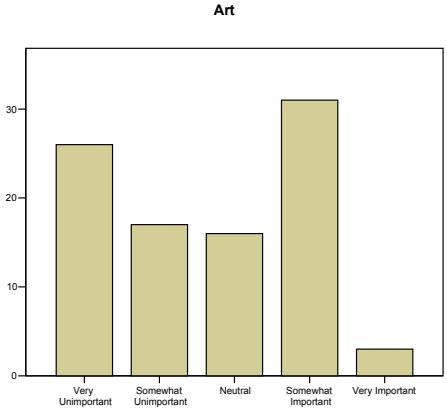
Senior Project

	Frequency	Percent	Valid Percent	Cumulative Percent
Not Important	3	3.2	3.3	3.3
Somewhat Unimportant	2	2.2	2.2	5.5
Neutral	8	8.6	8.8	14.3
Somewhat Important	31	33.3	34.1	48.4
Very Important	47	50.5	51.6	100.0
Total	91	97.8	100.0	
No Response	2	2.2		
Total	93	100.0		



Art

	Frequency	Percent	Valid Percent	Cumulative Percent
Very Unimportant	26	28.0	28.0	28.0
Somewhat Unimportant	17	18.3	18.3	46.2
Neutral	16	17.2	17.2	63.4
Somewhat Important	31	33.3	33.3	96.8
Very Important	3	3.2	3.2	100.0
Total	93	100.0	100.0	



A comparison to an equivalent evaluation made as part of the 2000 PDET APR is summarized as follows.

Most Important Content	**Ranking 2006**	**Ranking 2000**
Solid Modeling CAD	1	Not Rated
Senior Project	2	3
Plastic Materials	3	4
Statics & Strength of Matl	4	1
Least Important Content		
Applied Calculus	15 of 17	15 of 17
Psychology	16 of 17	16 of 17
Art	17 of 17	17 of 17

This comparison indicates no significant change in the perceptions of program graduates since the last program review.

Q15 – Question 15. This question asked the respondent to identify what they believed were the most valuable aspects of the Product Design program.

Analysis; There were 82 responses to this question. The most common theme of the responses was related to the value of the senior design project (15 responses). Example responses included;[3]

> *Senior Design Project, as it applies understanding of the full scope of design, project management, presentation and communication.*
>
> *Senior Design Project- learned discipline in time management, prioritization and importance of clear written communication skills.*
>
> *Senior design project was the most valuable because it required problem solving, talking to customers and suppliers. It also made you focus on cost and how you can improve the design, but make it cost effective.*

The applied nature of the curriculum was another common theme identified by 13 graduates. Example responses included;

> *The most valuable aspects of the PDET program in the real life situations discussed in the classes. Also, being applications centered has proven to be beneficial since it allows you to walk on to a new job and start to pay dividends for the company you are working for.*
>
> *The real life examples were most helpful in remembering the material. I still can't ride on an airplane without thinking about the safety factor they are built with.*
>
> *The PDET's most valuable aspect is its "real life" engineering approach. This method of applied engineering has given me the tools to be an asset to my company right out of college. Since graduation, there has not been one engineering problem I couldn't solve. I did notice the difference between graduates with M.E. degrees. They usually required some form of mentoring for a couple of years. This made me realize how lucky I was to graduate from FSU with a PDET degree.*

[3] All quotations are presented as they were written by the respondent except for the removal of names and personal references.

Ten responses linked the value of the program to the breadth of the curriculum. Example responses included;

The wide range of applied courses makes or develops a student into a well-rounded individual.

The broad based nature of the program, which allows a person to move into many potential opportunities.

See Appendix B for all responses to this question.

Q16 – Question 16. This question asked the respondent to identify what they believed were the least valuable aspects of the Product Design program.

Analysis; There were 67 responses to this question. The most common theme of the responses was related to specific courses in the curriculum with general education courses (Psychology – 12 responses, Art – 7 responses) most frequently identified as lacking value. Electronics (6 responses) was the most common technical course identified. An important aspect of the responses to this question was that 11 graduates (16%) were not able or willing to identify an aspect of the program that lacked value. Example responses included;

Everything I was exposed to in the PDET program has had a hand in everything I do at work, from ergonomics to technical writing. I think everything is valuable.

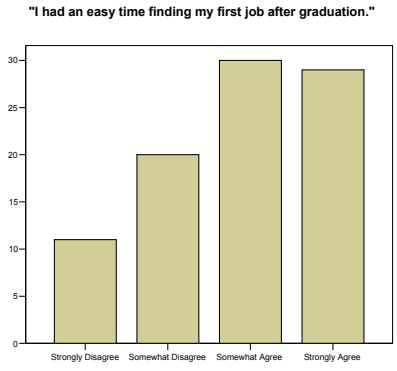
All the courses had a valuable aspect to the program.

See Appendix B for all responses to this question.

Q17 – Question 17. This question asked the responding program graduate to indicate how much difficulty they experienced in obtaining employment after graduation by indicating their level of agreement/disagreement with the statement, "I had an easy time finding my first job after graduation."

I had an easy time finding my first job after graduation.

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Disagree	11	11.8	12.2	12.2
	Somewhat Disagree	20	21.5	22.2	34.4
	Somewhat Agree	30	32.3	33.3	67.8
	Strongly Agree	29	31.2	32.2	100.0
	Total	90	96.8	100.0	
	No Response	3	3.2		
Total		93	100.0		

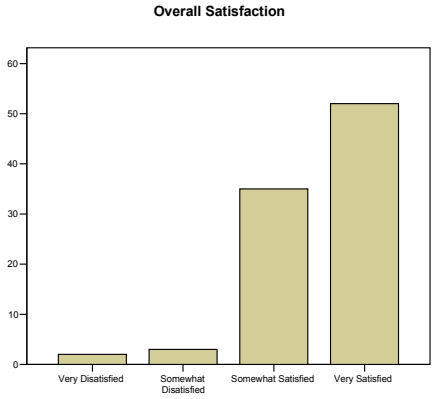


Analysis; The survey results indicated that 29 responding graduates (31%) had little difficulty in finding employment after graduation. This can be compared with 11 of the responding program graduates (11.8%) that indicated a high level of difficulty in finding employment after graduation. Overall the response to this question indicates that most graduates (63.5% vs 33.3%) experienced little perceived difficulty in obtaining employment after completing their Product Design degree program.

Q18 – Question 18. This question asked the respondent to indicate their overall level of satisfaction with their Product Design education.

Overall Satisfaction

		Frequency	Percent
	Very Disatisfied	2	2.2
	Somewhat Disatisfied	3	3.2
	Somewhat Satisfied	35	37.6
	Very Satisfied	52	55.9
	Total	92	98.9
	No Response	1	1.1
Total		93	100.0

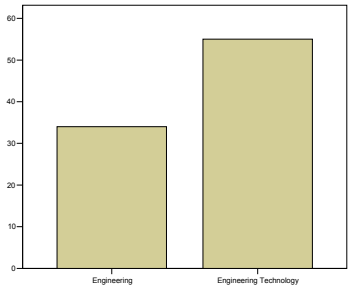


Analysis; The survey indicated that 52 responding students (55.6%) were very satisfied with their Product Design education. Only 5 responding students (5.7%) indicated any dissatisfaction with the program. Overall the response to this question indicates a high level of satisfaction among program graduates for the education they received in the program.

Q19 – Question 19. This question asked the respondent to indicate if they thought the Product Design program should be changed to an engineering program (as opposed to remaining an engineering technology program).

Engineering or Engineering Technology ?

		Frequency	Percent
	Engineering	34	36.6
	Engineering Techology	55	59.1
	Total	89	95.7
	No Response	4	4.3
Total		93	100.0

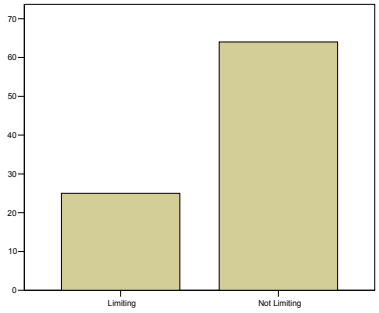


Analysis; The survey indicated that 55 responding students (59.1%) thought the Product Design program should remain an engineering technology curriculum. A notable number of responding students (34 students / 36.6%) did indicate the program should be changed to an engineering curriculum.

Q20 – Question 20. This question asked responding students to indicate if they thought that being a graduate of an engineering technology rather than an engineering program was a career limitation.

Engineering Technology - Career Limitation?

		Frequency	Percent
	Limiting	25	26.9
	Not Limiting	64	68.8
	Total	89	95.7
	No Response	4	4.3
Total		93	100.0

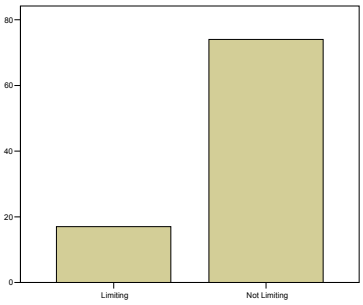


Analysis; The survey indicated that 64 responding students (68.8%) did not think that graduating from an engineering technology program was a career limitation. A notable number of responding students (25 students / 26.9%) however did indicate that they thought that the engineering technology classification of the program was career limiting.

Q21 – Question 21. This question asked responding students to indicate if they thought that being a graduate of a non-accredited engineering program was a career limitation.[4]

Lack of ABET Accreditation?

		Frequency	Percent
	Limiting	17	18.3
	Not Limiting	74	79.6
	Total	91	97.8
	No Response	2	2.2
Total		93	100.0



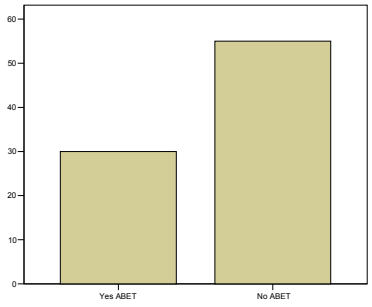
Analysis; Survey results indicated that 74 responding students (79.6%) did not think that graduating from a non-ABET accredited engineering technology program was a career limitation. A total of 17 responding students (18.3%) however did indicate that they thought the lack of ABET accreditation was a program limitation.

Q22 – Question 22. This question asked responding students to indicate if they thought that the Product Design program should make changes necessary to obtain ABET accreditation.

[4] Currently the PDET program is not accredited by the Accreditation Board for Engineering and Technology (ABET).

Should PDET be ABET Accredited?

		Frequency	Percent
	Yes ABET	30	32.3
	No ABET	55	59.1
	Total	85	91.4
	No Response	8	8.6
Total		93	100.0

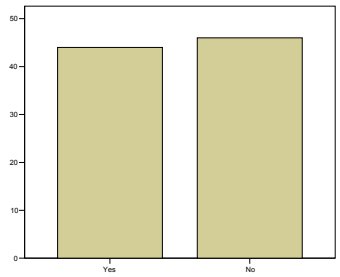


Analysis; Survey results indicated that 55 responding students (59.1%) did not think that the PDET program should pursue ABET accreditation. A significant number (30 / 32.3%) however did feel the program should become ABET accredited.

Q23 – Question 23. This question asked program graduates if they recommended joining a professional organization before graduation.

Join a Professional Organization Before Graduation?

		Frequency	Percent
	Yes	44	47.3
	No	46	49.5
	Total	90	96.8
	No Response	3	3.2
Total		93	100.0



Analysis; Responses to this question indicated an almost equal division of opinion among program graduates. Of 90 responses 44 (47.3%) recommended joining a professional organization before graduation while 46 (47.3%) did not.

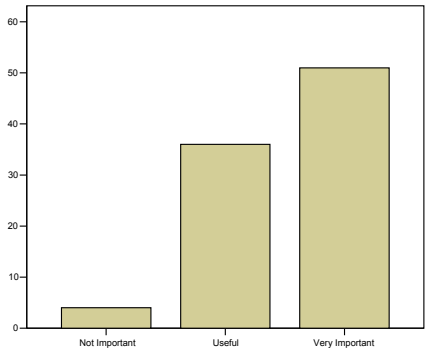
Q24 – Question 24. This question asked the responding program graduate to recommend a professional organization for PDET student membership..

Analysis; There were 42 responses to this question with 23 graduates (55%) recommending the Society of Automotive Engineers (SAE) for student membership. No other organization had a significant number of recommendations.

Q25 – Question 25. This question asked responding program graduates to indicate the relative importance of the ability to create hand-drawn renderings and sketches.

Ability to Draw Renderings and Sketches

		Frequency	Percent
	Not Important	4	4.3
	Useful	36	38.7
	Very Important	51	54.8
	Total	91	97.8
	No Response	2	2.2
Total		93	100.0



Analysis; A large number (87, 93.5%) thought that the ability to create hand drawn renderings and sketches was Useful or Very Important. Only 4.3% of responding graduates thought that this ability was not important.

Q26 – Question 26. This question provided the responding program graduate with the opportunity to recommend changes or make general comments about the Product Design program.

Analysis; There were 56 responses to this question. Responses included short as well as extensive responses and ranged from positive to negative in nature. In most cases the responses seemed to amplify an area already addressed in the survey. No common response areas or themes were identifiable in the responses obtained. See Appendix B for all responses to this question.

SECTION 2 B

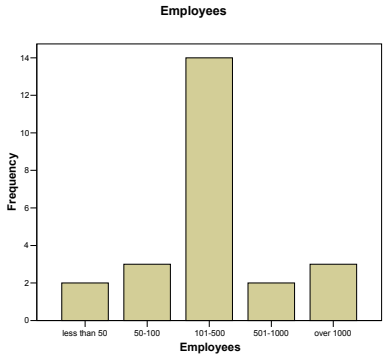
COLLECTION OF PERCEPTIONS - EMPLOYER FOLLOW-UP SURVEY

To assess the characteristics and needs of the work environment experienced by Product Design program graduates, a survey instrument was developed to evaluate targeted areas. The survey instrument, titled *Industrial Survey,* is provided in Appendix B. The survey was developed by FSU Institutional Testing and Research in conjunction with program faculty. This survey was sent to employers in the West Michigan area through off-campus PDET students taking the program in Grand Rapids. This group was selected because it is representative of the West Michigan employment environment. Forty (40) surveys were sent to different companies with an introductory letter and a self-addressed return envelope. As described in the survey's introductory letter (included in Appendix B), each student was instructed to present the survey to someone at their current employer who was in a position of to evaluate the effectiveness of mechanical design within the organization. Students who were not working in an appropriate area and/or were unemployed did not participate. After a two month period 24 of 40 surveys had been returned and are the basis of the employer analysis.

Q1 – Question 1. This question asked the respondent to define the number of employees at their facility.

Employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 50	2	8.3	8.3	8.3
	50-100	3	12.5	12.5	20.8
	101-500	14	58.3	58.3	79.2
	501-1000	2	8.3	8.3	87.5
	over 1000	3	12.5	12.5	100.0
	Total	24	100.0	100.0	

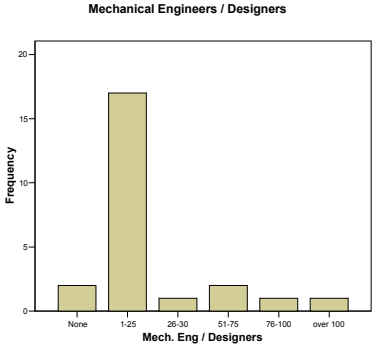


Analysis; Reponses indicated that most employers surveyed (58.3%) had between 100 and 500 employees.

Q2 – Question 2. This question asked the respondent to define the number of mechanical engineers / designers (the primary employment target for PDET program graduates) working at their facility.

Mechanical Engineers / Designers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	2	8.3	8.3	8.3
	1-25	17	70.8	70.8	79.2
	26-30	1	4.2	4.2	83.3
	51-75	2	8.3	8.3	91.7
	76-100	1	4.2	4.2	95.8
	over 100	1	4.2	4.2	100.0
	Total	24	100.0	100.0	



Analysis; Reponses indicated that most employers surveyed (70.8%) had between 1 and 25 mechanical engineers / designers working at their facility.

Q3 – Question 3. This question asked the respondent to describe the primary activity of their company.

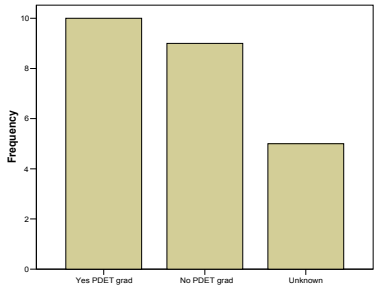
	Number	Frequency
Manufacturing Activity	21	87.5%
Design Activity	10	41.7%
One Activity on site	13	59.1%
Two Activities on site	8	36.4%

Analysis; Reponses indicated that most employers surveyed (21 employers, 87.5%) were primarily involved in manufacturing. A lesser number (10 employers, 41.7%) were primarily involved in design. Thirteen employers (59.1%) were only involved in one activity and eight employers (36.4%) were involved in two activities.

Q4 – Question 4. This question asked the respondent to indicate if they currently employed a FSU Product Design program graduate.

FSU PRODUCT DESIGN GRADUATE ON STAFF

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes PDET grad	10	41.7	41.7	41.7
	No PDET grad	9	37.5	37.5	79.2
	Unknown	5	20.8	20.8	100.0
	Total	24	100.0	100.0	

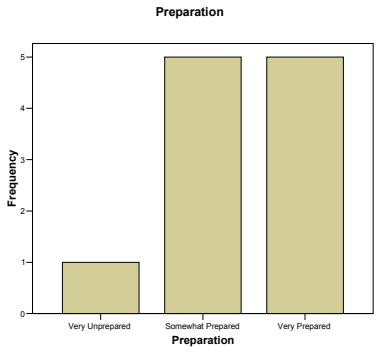


Analysis; Reponses indicated a relatively equal number of respondents with a PDET program graduate as those that did not have a program graduate on staff (41.7% with vs. 37.5% without). Some respondents (20.8%) did not know if they had a PDET program graduate on staff.

Q5 – Question 5. This question asked the respondents having a FSU PDET graduate to evaluate the graduate's level of preparation for work at the company.

Preparation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unprepared	1	4.2	9.1	9.1
	Somewhat Prepared	5	20.8	45.5	54.5
	Very Prepared	5	20.8	45.5	100.0
	Total	11	45.8	100.0	
Missing	System	13	54.2		
Total		24	100.0		



Analysis; Reponses indicated that most employers having a PDET program graduate on staff (91%), thought that PDET program graduates were Very Prepared or Somewhat Prepared (45.5% for each) to work for their company.

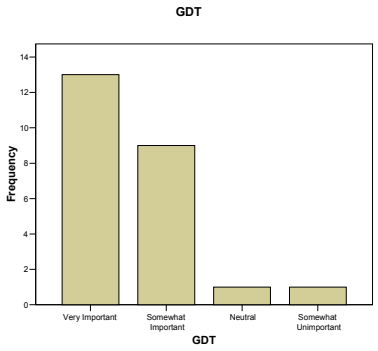
Q6 – Question 6. This question asked the respondents to evaluate the relative importance that the major course/skill areas of the Product Design Engineering Technology academic program would have if they were hiring a new program graduate. For this question the respondent was asked to provide a Likert scaled response for each of 22 subject areas applicable to the PDET curriculum. Responses were coded on a 1 to 5 scale, with 1 designated as 'Very Important', 2 as 'Somewhat Important', 3 as a neutral response, 4 as 'Somewhat Unimportant' and 5 as 'Very Unimportant'. To identify the courses with the most extreme evaluations the mean response value for each subject area was calculated. Using this information, reflected in the following table, the courses with the highest (lowest mean score) and lowest (highest mean score) perceived value were determined.

	N	Mean
GDT	24	1.5833
MATL	24	1.6667
PLTS	24	2.2500
Metal	24	1.6667
Statics	24	1.6667
Dynamics	24	2.0833
Chemistry	24	2.6667
Physics	24	1.9583
FEA	24	2.0833
FMEA	24	1.8333
DesManf	24	1.5417
MachDes	24	2.2500
Thermo	23	2.8261
Fluids	24	2.7917
Electronics	24	2.8333
CAD3d	24	1.5417
Ergonomics	24	2.5833
Statistics	24	2.5000
RendandSkt	24	2.5000
ManDrft	24	3.5417
IndPSYCH	24	3.4583
AppliedCalc	24	2.9167
Valid N (listwise)	23	

Analysis; The subject areas with the highest perceived value were Geometric Dimensioning & Tolerancing (GDT), Three Dimensional, Solid Modeling CAD (CAD3d) and Design for Manufacturing (DesManf). The subject areas with the lowest perceived value to the employers surveyed were Manual Drafting (ManDrft) and Industrial/Organizational Psychology (IndPSYCH). More detail was developed for each of these courses with exceptional ratings and is presented in the following summaries.

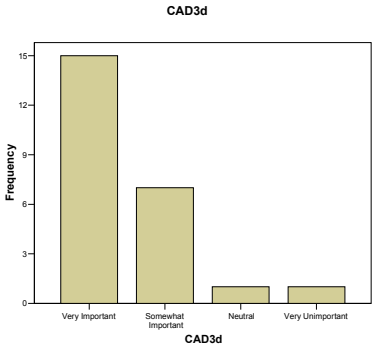
GDT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	13	54.2	54.2	54.2
	Somewhat Important	9	37.5	37.5	91.7
	Neutral	1	4.2	4.2	95.8
	Somewhat Unimportant	1	4.2	4.2	100.0
	Total	24	100.0	100.0	



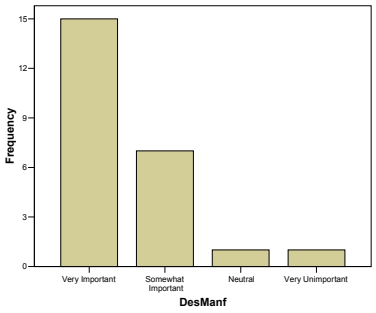
CAD3d

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	15	62.5	62.5	62.5
	Somewhat Important	7	29.2	29.2	91.7
	Neutral	1	4.2	4.2	95.8
	Very Unimportant	1	4.2	4.2	100.0
	Total	24	100.0	100.0	



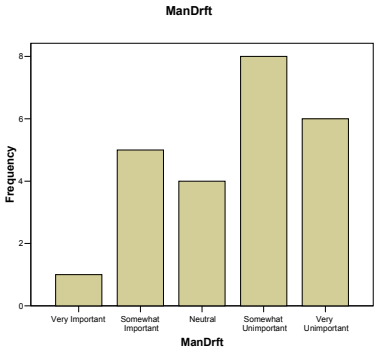
DesManf

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	15	62.5	62.5	62.5
	Somewhat Important	7	29.2	29.2	91.7
	Neutral	1	4.2	4.2	95.8
	Very Unimportant	1	4.2	4.2	100.0
	Total	24	100.0	100.0	



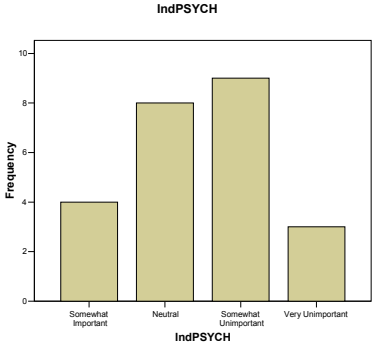
ManDrft

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	1	4.2	4.2	4.2
	Somewhat Important	5	20.8	20.8	25.0
	Neutral	4	16.7	16.7	41.7
	Somewhat Unimportant	8	33.3	33.3	75.0
	Very Unimportant	6	25.0	25.0	100.0
	Total	24	100.0	100.0	



IndPSYCH

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	4	16.7	16.7	16.7
	Neutral	8	33.3	33.3	50.0
	Somewhat Unimportant	9	37.5	37.5	87.5
	Very Unimportant	3	12.5	12.5	100.0
	Total	24	100.0	100.0	



A comparison to an equivalent evaluation made as part of the 2000 PDET APR is summarized as follows.

Most Important Content	Ranking 2006	Ranking 2000
Solid Modeling CAD	1	2
Design for Manufacturing	1	1
GD&T	2	3
Least Important Content		
Industrial/Org. Psychology	23 of 24	21 of 22
Manual Drafting	24 of 24	22 of 22

This comparison indicates no significant change in employer perceptions since the last program review.

Q7 – Question 7. This question asked the respondent to indicate which Computer Aided Design (CAD) software they currently use at their facility. The following table provides a summary of the responses to this question including a comparison to the evaluation made in the 2000 PDET program APR.

CAD Software	Number Using in 2006	Number Using in 2000
AUTOCAD	11	10
ProEngineer	10	6
Unigraphics	8	5
Solid Works	7	2
CATIA	4	4
Other CAD	4	10
TOTAL RESPONSES	44	37

It should be noted that the more recent survey provided 44 responses from 24 employers surveyed and the data from 2000 provided 37 responses from 21 employers. This result was expected since responding employers for this years survey (2006) had the opportunity to indicate that more than one software package was used. This is quantified by the following table.

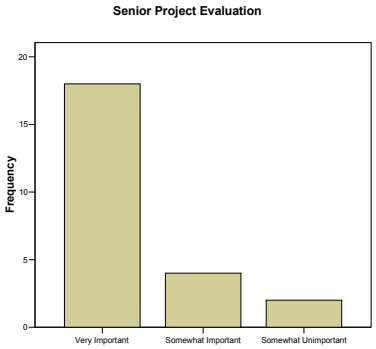
Number used	
One	13
Two	6
Three	1
Four	4

Analysis; The response to this question indicated no significant change in the CAD software used by those employers who typically hire PDET graduates. All PDET graduates have AUTOCAD familiarity upon entering the program and all instruction within the program is based on ProEngineer software. The expansion in the use of Solid Works software is notable and will be monitored periodically in the future.

Q8 – Question 8. This question asked the respondent to evaluate the importance of the Product Design senior project that serves as a capstone experience and assessment instrument for the curriculum. This question is intentionally coupled to question 9 but differs in that it asks for an overall assessment of the course and its content. The four category response used for this evaluation included ‘Very Important’, ‘Somewhat Important’, ‘Somewhat Unimportant’ and ‘Very Unimportant’ ratings.

Senior Project Evaluation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	18	75.0	75.0	75.0
	Somewhat Important	4	16.7	16.7	91.7
	Somewhat Unimportant	2	8.3	8.3	100.0
	Total	24	100.0	100.0	



Analysis; The response to this question indicates that 75% of typical PDET graduate employers consider the Senior Project activity to be a 'Very Important' activity.

Q9 – Question 9. This question asked the respondent to evaluate the importance of specific elements of the Product Design senior project that serves as a capstone experience and assessment for the curriculum. This question is intentionally coupled to question 8 but differs in that it asks for an assessment of specific course content. As was used for question 6, a Likert scaled response was provided. This 1 to 4 scale designated 1 as 'Very Important', 2 as 'Somewhat Important', 3 as 'Somewhat Unimportant' and 4 as 'Very Unimportant'. The mean response value for each subject area was calculated and compared to a similar evaluation made as part of the 2000 PDET Program Review. The results of this evaluation are shown in the following table.

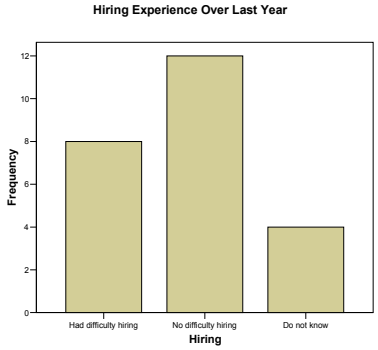
Project Activity	Average Evaluation	Ranking 2006	Ranking 2000
Design Reviews	1.33	1	n.a.
Prototype Development	1.43	2	2
Project Management	1.46	3	1
Technical Presentation	1.58	4	4
Written Status Reports	1.67	5	5
Estimating & Budgeting	1.67	5	n.a.
Proposal Development	1.71	7	2
Formal Written Report	1.79	8	6

Analysis; The response to this question indicates that all identified elements of the PDET capstone project are considered important by potential PDET employers with all elements evaluated between 'Somewhat Important' and 'Very Important'. The only notable shift in perception was a decreased importance in the Proposal Development activity in the more recent survey. A possible causal difference is the characteristics of the sampled population (sampling error) between the 2000 and 2006 surveys. If the employers in the current (2006) survey had less direct engineering involvement with project promotion than the employers in the earlier (2000) survey, this would reduce the perceived value of that element.

Q10 – Question 10. This question asked the respondent to indicate any difficulty in hiring qualified mechanical engineers / designers during the last year.

Hiring

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Had difficulty hiring	8	33.3	33.3	33.3
	No difficulty hiring	12	50.0	50.0	83.3
	Do not know	4	16.7	16.7	100.0
	Total	24	100.0	100.0	

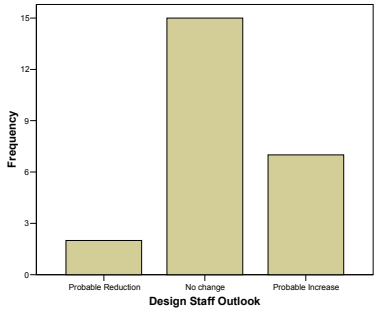


Analysis; The response to this question indicates that most potential employers of PDET graduates have not had difficulty in hiring new employees in this skill area during the last year.

Q11 – Question 11. This question asked the respondent to indicate staffing changes likely to occur during the next year.

STAFFING CHANGES NEXT YEAR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Probable Reduction	2	8.3	8.3	8.3
	No change	15	62.5	62.5	70.8
	Probable Increase	7	29.2	29.2	100.0
	Total	24	100.0	100.0	



Analysis; The responses to this question indicates little change is predicted in staffing levels by potential employers during the next year.

Q12 – Question 12. This question asked the respondent to indicate their level of familiarity with the differences between engineering and engineering technology degree programs.

ETvEngDiff

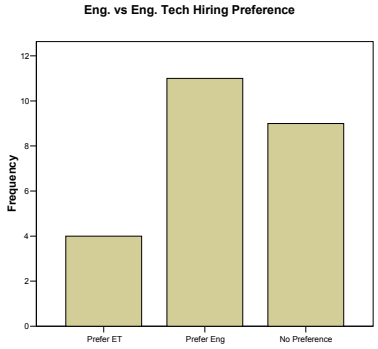
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Familiar	12	50.0	50.0	50.0
	Not Familiar	12	50.0	50.0	100.0
	Total	24	100.0	100.0	

Analysis; The responses to this question indicates that only one half of potential PDET employers thought they were familiar with the differences between engineering and engineering technology academic programs.

Q13 – Question 13. This question asked the respondent to indicate a hiring preference between engineering and engineering technology graduates for a mechanical design position.

EvETpref

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Prefer ET	4	16.7	16.7	16.7
	Prefer Eng	11	45.8	45.8	62.5
	No Preference	9	37.5	37.5	100.0
	Total	24	100.0	100.0	

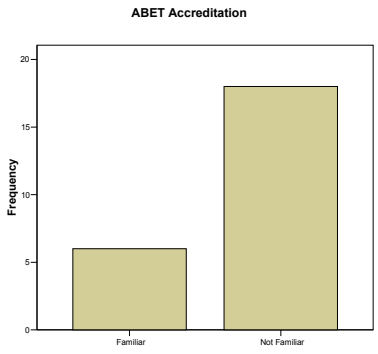


Analysis; Although a sizeable number (37.5%) of respondents have no hiring preference between engineering and engineering technology graduates, a large percentage of those who have a preference would prefer to hire an engineering program graduate (45.8% vs. 16.7%). Note that this strong preference was made by an employer group of which only 50% claim to have knowledge of the differences between the two degree types (see question 12).

Q14 – Question 14. This question asked the respondent to indicate their level of familiarity with engineering accreditation standards.

ABETacred

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Familiar	6	25.0	25.0	25.0
	Not Familiar	18	75.0	75.0	100.0
	Total	24	100.0	100.0	



Analysis; The response to this question indicates that 75% of potential PDET program graduates are not aware of engineering and engineering technology accreditation standards.

Q15 – Question 15. This final survey element provided space for responding employers to make any additional comments about the PDET program, its students and/or its graduates. Submitted responses were;

1. *Keep the senior design project, they are very important*
2. *Keep current with industry. Need more electrical with mechanical*
3. *½ of Engineers at company are Engineer BS program graduates & ½ are Engineering Technology BS Graduates. Both are sufficient for our type of work the BS is important.*
4. *Already employed is fine, but many BS MET & BS EET were reclassified as designers*
5. *I think that Ferris and GRCC do a great job in identifying local manufacturing needs and tailoring programs to prepare students for those positions*
6. *The most important skill for any technical position is Communication. If a person cannot communicate verbally and more importantly in writing, they will have no future. Being able to organize thoughts logically, clearly and concisely is a lost art that needs to be taught. Below is a prioritized list of the most important skills for an Engineering student.*
    1. *Communication*
    2. *Product Design*
    3. *Project Modeling*
    4. *Solid Modeling*
    5. *FEA*
    6. *Statics*
    7. *Strength of Materials*
    8. *Design for MFG*
    9. *FMEA*
    10. *Statistics*

SECTION 2 C & D

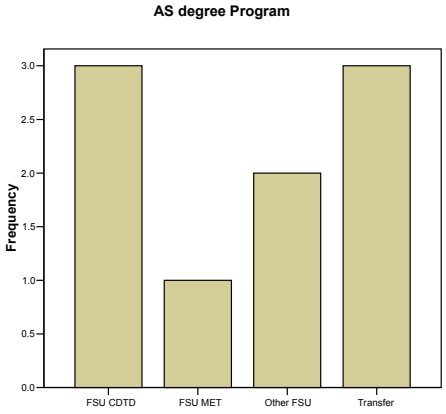
COLLECTION OF PERCEPTIONS - GRADUATING STUDENT EXIT SURVEY & STUDENT PROGRAM EVALUATION

The Product Design Engineering Technology program, designed as a 3rd and 4th year (+2) program, has only upper division students. With only two class years of students, an adequate survey of student perceptions was obtained by surveying the graduating PDET class of May 2006. One unique aspect of the survey activity completed was that separate surveys were completed for both on-campus and off-campus students. The results of these surveys are presented consecutively and should be evaluated separately. The difference in program duration creates a significantly difference experience base that should not be directly compared except for very general observations.

Survey of 2006 On-Campus Graduating Students

A relatively small graduating class of on-campus students provided 10 completed surveys representing all on-campus graduates for 2006. The survey was completed on the last class meeting of the capstone project class at the end of winter semester. A copy of the survey, including 14 response elements, is provided in Appendix B. The survey instrument is relatively unchanged from the exit surveys administered to all PDET graduating seniors for the last 10 years. Longitudinal information based on prior surveys is not included in this report, however due to the large volume of this data and the general observation that the 2006 survey is typical / representative of prior surveys.

Question 1. This question asked the student to indicate where they earned their associates degree prior to starting the PDET program.

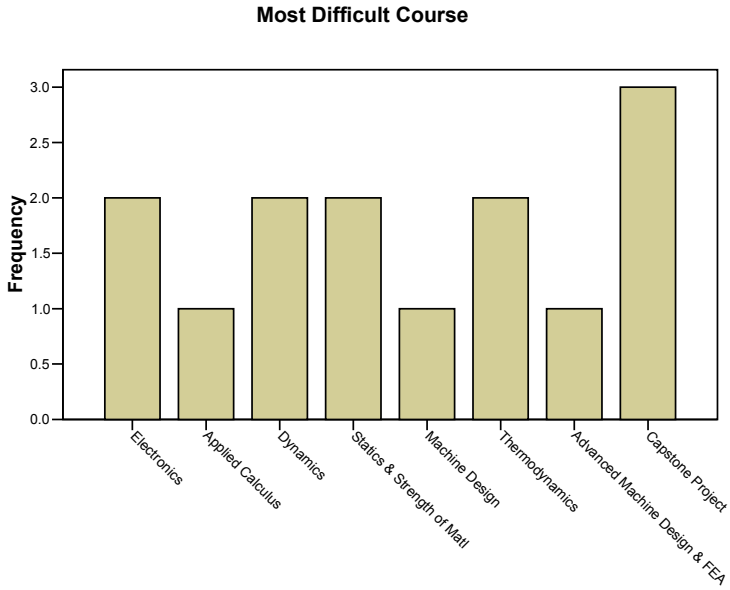


Analysis; The response to this question indicates that the on-campus PDET class of 2006 was primarily made up of students from the FSU CDTD program and transfer students. This is consistent with the overall composition indicated throughout the programs history (see Figure 3.4). A reduced number of FSU Mechanical Engineering Technology students relative to program history can also be noted. This is an area of concern and is also consistent with the analysis presented in Section 3 B of this report.

Q2 and Q3 requested student recommendations for upper level cultural enrichment course selection and are not analyzed in this report.

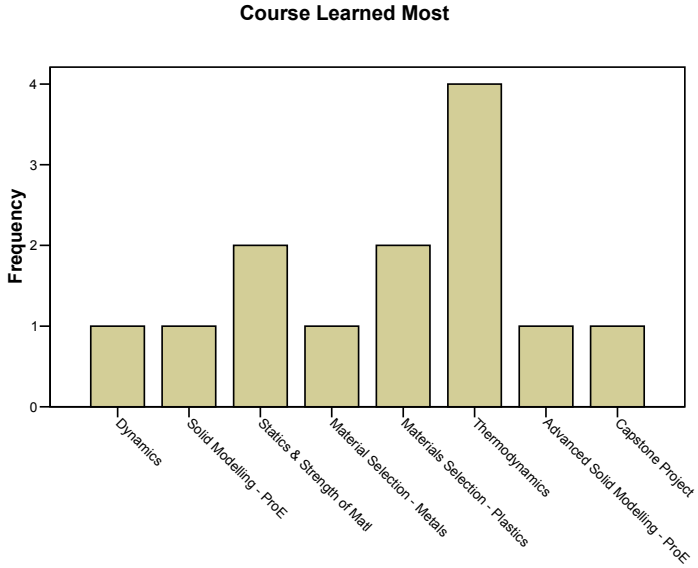
Questions 4 through 9 asked graduating students to evaluate the courses in the PDET curriculum. Students were allowed to make multiple selections for each question resulting in more responses than responding students.

Question 4. This question asked the student to indicate which course in the PDET curriculum that they found most difficult.



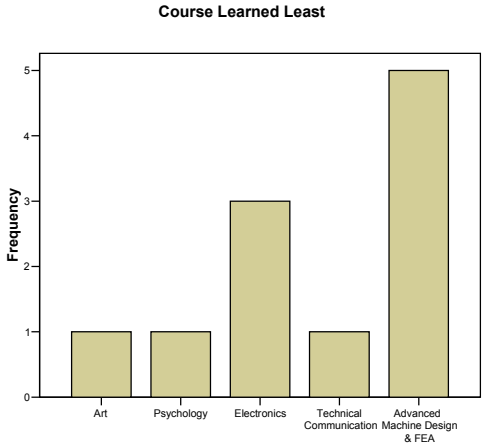
Analysis; The responses to this question indicates that the on-campus PDET class of 2006 thought that the capstone senior project course was the most difficult program course.

Question 5. This question asked the student to indicate the course in the PDET curriculum in which they thought they learned the most.



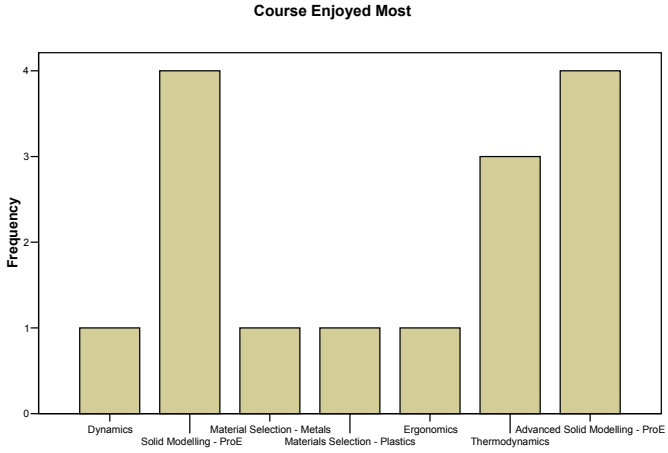
Analysis; The responses to this question indicates that the on-campus PDET class of 2006 thought that they learned the most in Thermodynamics (PDET 413).

Question 6. This question asked the student to indicate the course in the PDET curriculum in which they thought they learned the least.



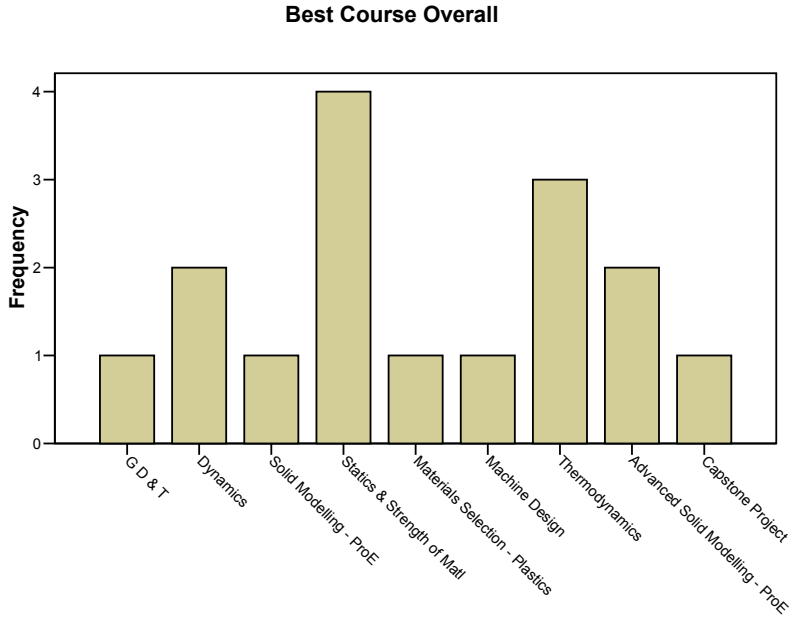
Analysis; The responses to this question indicates that the on-campus PDET class of 2006 thought that they learned the least in Advanced Machine Design (PDET 422) and Electronics (EEET 201).

Question 7. This question asked the student to indicate the course in the PDET curriculum which they enjoyed the most.



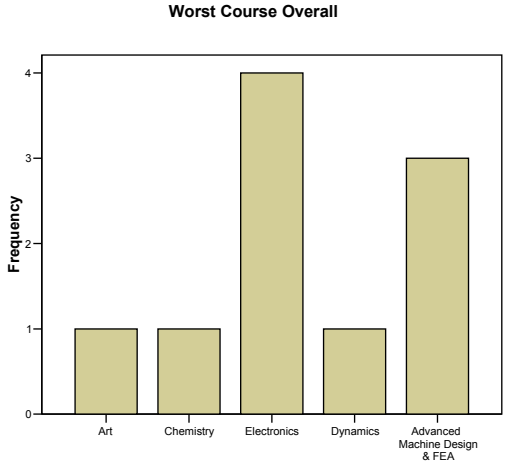
Analysis; The responses to this question indicates that the on-campus PDET class of 2006 most enjoyed the two CAD Solid Modeling courses (PDET 322 and PDET 415).

Question 8. This question asked the student to indicate what they consider to be the best course in the PDET curriculum.



Analysis; The responses to this question indicates that the on-campus PDET class of 2006 thought Statics and Strength of Materials (MECH 340) and Thermodynamics (PDET 413) were the best courses in the PDET program.

Question 9. This question asked the student to indicate what they consider to be the worst course in the PDET curriculum.



Analysis; The responses to this question indicates that the on-campus PDET class of 2006 thought Electronics (EEET 201) and Advanced Machine Design (PDET 422) were the worst courses in the PDET program.

Question 10. This question asked the graduating students to evaluate their overall level of satisfaction with the academic advising that they had received during their time in the PDET program. For this question, the student was asked to provide a Likert scaled response evaluating PDET program academic advising. Responses were coded on a 1 to 5 scale, with 1 designated as 'Not Satisfied', 3 as 'Moderately Satisfied' and 5 as 'Very Satisfied'. The mean response value for this question was 4.53 with a standard deviation of

.48. This indicates a high level of satisfaction with the academic advising provided to PDET program students.

Question 11. This question asked the graduating students to evaluate their overall level of satisfaction with the education that they received in the PDET program. For this question, the student was asked to provide a Likert scaled response evaluating their overall satisfaction with the PDET program. Responses were coded on a 1 to 5 scale, with 1 designated as 'Not Satisfied', 3 as 'Moderately Satisfied' and 5 as 'Very Satisfied'. The mean response value for this question was 4.28 with a standard deviation of .65. This indicates a high level of satisfaction with the education provided to PDET program students.

Question 12. A significant activity involved with the PDET capstone project is the requirement that each student formally present their project to a board of evaluators. Typically conducted in the FLITE on a Saturday at the end of the semester with an evaluating board made up of members of the Industrial Advisory Committee (IAC, see part F of this section), students typically find this to be a stressful but rewarding experience. Question 12 asked to student to indicate if they thought this review presentation could be improved. Eight of nine responding students thought the project presentation activity was acceptable as it is currently done. The two students that responded that the presentation activity required improvement recommended a practice session be provided (already included as part of the required COMM 336 course) and identified the need for the student to slow down while talking.

Question 13. Students were asked two questions relating to the use of Pro-Engineer software for solid modeling CAD coursework in the PDET program. Of ten responding students, nine students thought that the PDET program should continue to use Pro-Engineer as a software platform.[1] All ten responding students indicated that experience with Pro-Engineer software would improve their employment opportunities.

Question 14. All PDET on-campus students are required to provide their own notebook personal computer for use in PDET program courses. For students this is a significant additional educational expense but one that allows them unlimited access to computing resources. Graduating PDET students were asked if they believed that this requirement was a good idea for the program. For this question, the student was asked to provide a Likert scaled response indicating their opinion of the PC requirement. Responses were coded on a 1 to 5 scale, with 1 designated as a 'Good Idea' and 5 as a 'Bad Idea'. The mean response value for this question was 1.70 with a standard deviation of .67. This indicates that PDET program students are generally supportive of requiring PDET students to have notebook computers.

Question 15. This final survey element provided space for responding students to make any additional comments or recommendations about the PDET program.

1. *Thanks for everything*
2. *There are not many good computers with the PRO/E software on campus, and the ones that do usually have a bad printer or no printer at all. More instructions on drawings, dimensioning and tolerance using the PRO-E software*
3. *Try not to have xxxx teach any PDET classes*
4. *One of the best learning experiences I ever had.*
5. *PDET 422 should be separated into 2 classes one for FEA, the other for advance machine design book work*
6. *Maybe look into solid works*

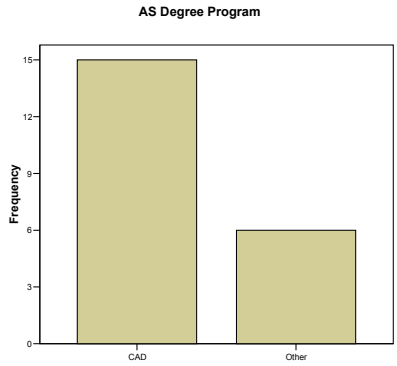
Survey of 2006 Off-Campus Graduating Students

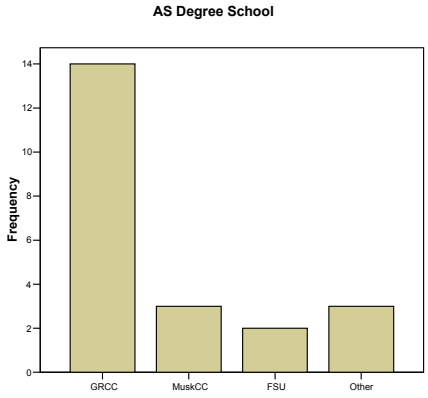
A total of 24 off-campus graduates completed surveys for 2006. The survey was completed on the last class meeting of the capstone project class at the end of winter semester. A copy of the survey including 15

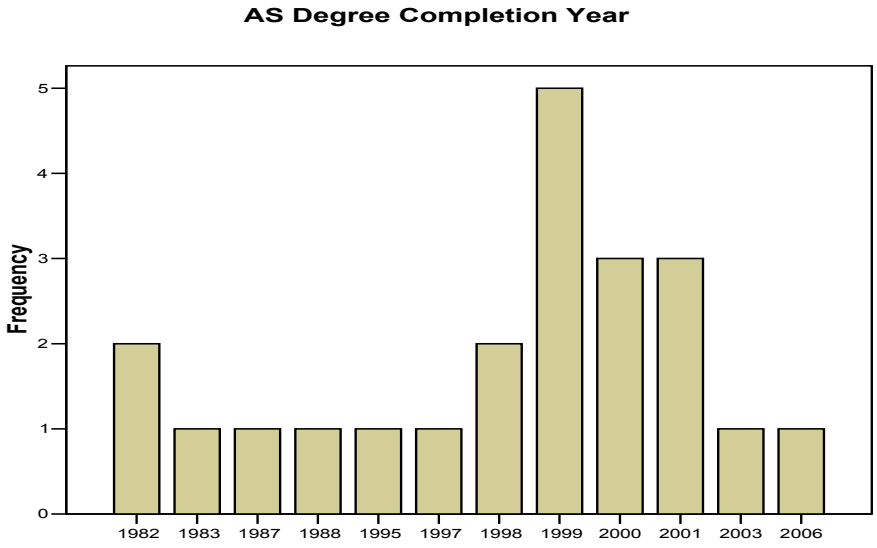
[1] Note that the on-campus student survey inadvertently included two questions labeled as 12. The second question 12 and question 13 are the questions evaluating Pro-Engineer software.

response elements is provided in Appendix B. The survey instrument is essentially the same as exit surveys administered to all PDET graduating seniors for the last 10 years. In some cases where noted however minor changes were made to the off-campus student survey to provide relevance with the off-campus program.

Question 1. This question asked the student for information related to their associates degree education prior to entering the Product Design program.





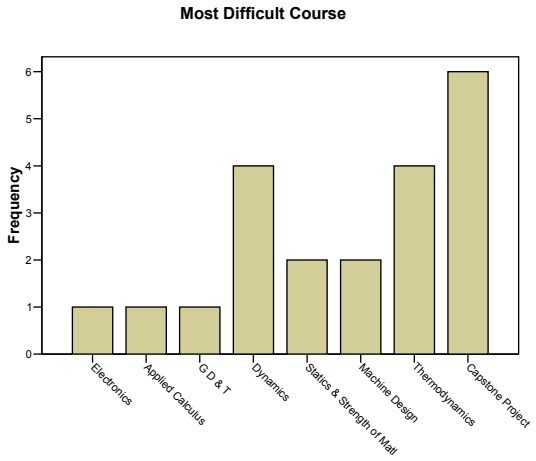


Analysis; The responses to this question indicate that the off-campus PDET class of 2006 was primarily made up of students with a Computer Aided Design (CAD) or Drafting background. Grand Rapids

Community College (GRCC) was the dominant prior educational background for these students and most of the off campus students (13 of 24) completed their prior education between 1998 and 2001. This is a predictable result considering the advantages that the program offers GRCC CAD students wishing to develop additional professional competency while remaining in the Grand Rapids area.

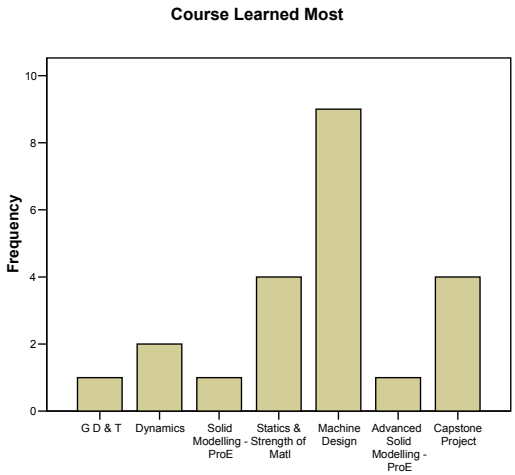
Questions 2 through 7 asked graduating off-campus students to evaluate the courses in the PDET curriculum. Students were allowed to make multiple selections for each question resulting in more responses than responding students

Question 2. This question asked the student to indicate which course in the PDET curriculum that they found most difficult.



Analysis; The responses to this question indicates that the off-campus PDET class of 2006 thought that the capstone senior project course was the most difficult program course.

Question 3. This question asked the student to indicate the course in the PDET curriculum in which they thought they learned the most.



Analysis; The responses to this question indicates that the off-campus PDET class of 2006 thought that they learned the most in Machine Design (PDET 411).

Question 4. This question asked the student to indicate the course in the PDET curriculum in which they thought they learned the least. The results of this question are presented in table form due to the large variety of responses.

Course Learned Least

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Art	5	10.2	14.7	14.7
	Psychology	2	4.1	5.9	20.6
	General Education	2	4.1	5.9	26.5
	Electronics	3	6.1	8.8	35.3
	PDET Seminar	1	2.0	2.9	38.2
	G D & T	1	2.0	2.9	41.2
	Dynamics	1	2.0	2.9	44.1
	Solid Modelling - ProE	1	2.0	2.9	47.1
	Advanced Composition	2	4.1	5.9	52.9
	Materials Selection - Plastics	3	6.1	8.8	61.8
	Mechanical Testing	1	2.0	2.9	64.7
	Ergonomics	1	2.0	2.9	67.6
	Advanced Machine Design & FEA	11	22.4	32.4	100.0
	Total	34	69.4	100.0	
Missing	System	15	30.6		
Total		49	100.0		

Analysis; The responses to this question indicates that the on-campus PDET class of 2006 thought that they learned the least in Advanced Machine Design (PDET 422) and Art (taken at GRCC).

Question 5. This question asked the student to indicate the course in the PDET curriculum which they enjoyed the most. The results of this question are presented in table form due to the large variety of responses.

Course Enjoyed Most

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Art	1	2.0	3.1	3.1
	General Education	1	2.0	3.1	6.3
	Electronics	3	6.1	9.4	15.6
	PDET Seminar	4	8.2	12.5	28.1
	Dynamics	2	4.1	6.3	34.4
	Solid Modelling - ProE	2	4.1	6.3	40.6
	Materials Selection - Plastics	2	4.1	6.3	46.9
	Design for Manufacturing	1	2.0	3.1	50.0
	Mechanical Testing	1	2.0	3.1	53.1
	Machine Design	5	10.2	15.6	68.8
	Ergonomics	1	2.0	3.1	71.9
	Thermodynamics	6	12.2	18.8	90.6
	Advanced Solid Modelling - ProE	2	4.1	6.3	96.9
	Capstone Project	1	2.0	3.1	100.0
	Total	32	65.3	100.0	
Missing	System	17	34.7		
Total		49	100.0		

Analysis; Responses to this question identified a wide variety of program courses. Off-campus PDET class of 2006 students most enjoyed Thermodynamics (PDET 413, 12.2%), Machine Design (PDET 411, 10.2%) and the PDET Seminar course (PDET 311, 8.2%).

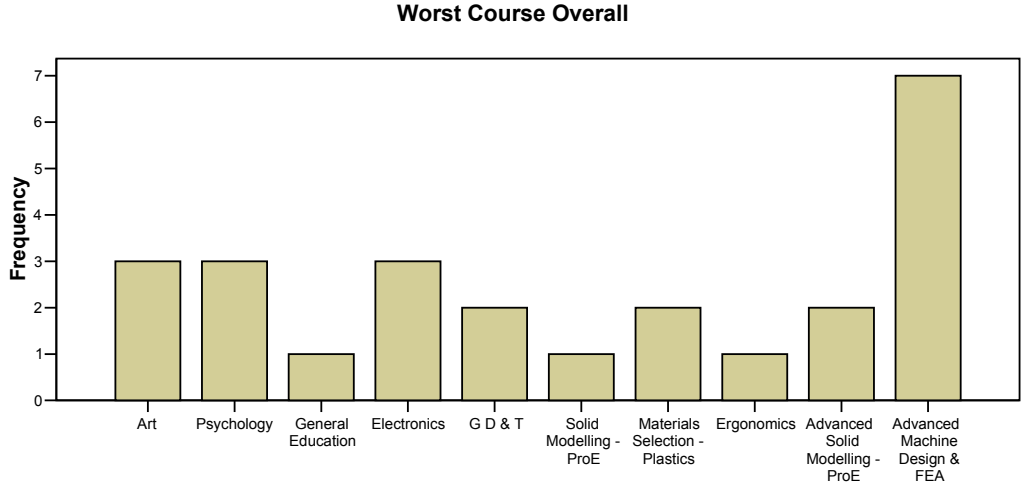
Question 6. This question asked the student to indicate what they consider to be the best course in the PDET curriculum. Responses to this question exhibited the greatest range of responses of any of the curriculum evaluation questions. Sixteen different courses were identified as the best in the PDET program.

Best Course Overall

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Art	1	2.0	2.0	2.0
	PDET Seminar	2	4.1	4.1	6.1
	Dynamics	4	8.2	8.2	14.3
	Solid Modelling - ProE	2	4.1	4.1	18.4
	Advanced Composition	1	2.0	2.0	20.4
	Technical Communication	1	2.0	2.0	22.4
	Statics & Strength of Matl	5	10.2	10.2	32.7
	Material Selection - Metals	1	2.0	2.0	34.7
	Materials Selection - Plastics	2	4.1	4.1	38.8
	Design for Manufacturing	2	4.1	4.1	42.9
	Machine Design	12	24.5	24.5	67.3
	Ergonomics	2	4.1	4.1	71.4
	Thermodynamics	5	10.2	10.2	81.6
	Advanced Solid Modelling - ProE	3	6.1	6.1	87.8
	Advanced Machine Design & FEA	2	4.1	4.1	91.8
	Capstone Project	4	8.2	8.2	100.0
	Total	49	100.0	100.0	

Analysis; The responses to this question indicates that the off-campus PDET class of 2006 thought Statics and Strength of Materials (MECH 340, 10.2%), Machine Design (PDET 411, 24.5%) and Thermodynamics (PDET 413, 10.2%) were the best courses in the PDET program.

Question 7. This question asked the student to indicate what they consider to be the worst course in the PDET curriculum.



Analysis; The responses to this question indicates that the off-campus PDET class of 2006 thought Advanced Machine Design (PDET 422) was the worst course in the PDET program. The large difference in student perceptions regarding two courses regarding the same general subject area (Machine Design - PDET 411 vs Advanced Machine Design - PDET 422) was not analyzed but is thought to be based on the instructor assigned (see question 15 – comment #3). It should also be noted that four of the courses identified as 'worst' are provided by GRCC for the off-campus program.

Question 10. This question asked the graduating off-campus students to evaluate their overall level of satisfaction with the academic advising that they had received during their time in the PDET program. For this question, the student was asked to provide a Likert scaled response evaluating PDET program academic advising. Responses were coded on a 1 to 5 scale, with 1 designated as 'Not Satisfied', 3 as 'Moderately Satisfied' and 5 as 'Very Satisfied'. The mean response value for this question was 4.79 with a standard deviation of .59. This indicates a high level of satisfaction with the academic advising provided to PDET program off-campus students.

Question 11. This question asked the graduating off-campus students to evaluate their overall level of satisfaction with the education that they received in the PDET program. For this question, the student was asked to provide a Likert scaled response evaluating their overall satisfaction with the PDET program. Responses were coded on a 1 to 5 scale, with 1 designated as 'Not Satisfied', 3 as 'Moderately Satisfied' and 5 as 'Very Satisfied'. The mean response value for this question was 4.75 with a standard deviation of .44. This indicates a high level of satisfaction with the education provided to PDET program off-students.

Question 12. A significant activity involved with the PDET capstone project is the requirement that each student formally present their project to a board of evaluators. For off-campus students the reviews are conducted in the FSU conference room in the Applied Technology Center, Grand Rapids over several evenings at the end of the semester. Consistent with the on-campus program, students present their projects to an evaluating board made up of members of the Industrial Advisory Committee (IAC, see part F of this section). Most students find this to be a stressful but rewarding experience however the typical off-campus student is more familiar with this type of review than on-campus students. Question 12 asked the student to indicate if they thought this review presentation could be improved. Responding students thought the project presentation activity was acceptable as it is currently done by a 21 to 2 margin (87.5%). The two students that responded that the presentation activity required improvement commented on the time required to prepare for the presentation and the level of stress induced.

Question 13 and Question 14. Students were asked two questions relating to the use of Pro-Engineer software for solid modeling CAD coursework in the PDET program. Of 24 responding students, 17 students (70.8%) thought that the PDET program should continue to use Pro-Engineer as a software platform. Nineteen of 24 responding off-campus students (79.2%) indicated that experience with Pro-Engineer software would improve their employment opportunities.

Question 15. PDET off-campus students, unlike on-campus students, are not required to provide their own notebook personal computer for use in PDET program courses. Prior research has shown that student perceptions regarding this requirement reflect the trade off between the significant additional educational expense involved versus having unlimited access to computing resources. Graduating PDET off-campus students were asked if they believed that this requirement should be incorporated for the off-campus program. For this question, the student was asked to provide a Likert scaled response indicating their opinion of making a laptop PC a requirement for the off-campus program. Responses were coded on a 1 to 5 scale, with 1 designated as a 'Good Idea' and 5 as a 'Bad Idea'. The mean response value for this question was 2.08 with a standard deviation of 1.32. This indicates that PDET off-campus students are generally supportive of making this a requirement for the off-campus program but to a lesser degree and with a wider variation of opinion than the level of support indicated by on-campus students.

The final survey element provided space for responding students to make any additional comments or recommendations about the PDET off-campus program.

1. *Thanks for a great education*
2. *I am proud of my degree from Ferris*
3. *Professor xxxx can not be surpassed in his ability to instruct difficult topics*
4. *Thank you xxxx – it truly has been a pleasure*
5. *Enjoyed the classes & instructors. I'd recommend the program to anyone who was interested in Product Design*

SECTION 2 E

COLLECTION OF PERCEPTIONS – FACULTY PERCEPTIONS

There are currently two faculty members assigned to the Product Design Engineering Technology program. Richard Goosen was the third program faculty member hired since the beginning of the Product Design Program in 1988. He arrived at FSU in the fall of 1993 and is currently the senior faculty member in the program. William Koepf is the junior faculty member in the program and was hired in the fall of 2000.

Perceptions of Richard Goosen PE
Professor of Product Design Engineering Technology

Overall perceptions regarding the PDET program.

The Product Design Engineering Technology (PDET) program has several remarkable characteristics that make it unique among the various programs offered at Ferris State University. The program is exceptionally efficient relative to any metric. Two program faculty with one multi-use classroom produce as many or more graduates as many other much larger and better equipped programs. Overall the program is the smallest in terms of faculty and expenditures and among the largest in graduate production. PDET program faculty are among the highest in student credit hour production in the College of Technology and are above the FSU average in faculty productivity. The production of PDET prefix courses and the degree credit hour cost are also at or near the best in the college and above university average.

The program is remarkable in terms of a commitment to improvement. Both program faculty members have completed over 30 semester hours each of graded graduate level courses at their own expense, in many cases while accommodating a teaching overload. In addition they have completed other technical training classes and seminars which were in nearly all cases scheduled outside the academic year so as not to impact classes. When five years ago it became obvious from employer feedback that program graduates needed experience in CAD solid modeling, it was incorporated into the curriculum years before similar initiatives have been launched in other programs.

PDET is also an exceptionally innovative program. When lab facilities and the program budget could not support the inclusion of CAD solid modeling, the PDET program faculty developed the first mandatory student notebook computer curriculum at FSU. This actually produced a reduction in College of Technology expense concurrent with increasing student satisfaction and learning.

The final overall perception of the PDET program is its uniqueness. It is the only true +2 year program in the College of Technology in that it does not have or depend upon any linkage to a specific two year feeder curriculum. It is therefore unique in terms of its transferability. It is also unique in its objective to offer a program stressing the design and development of mechanically based products rather than components to a variety of potential students, the program has few parallels within baccalaureate programs within the state of Michigan or nationally.

Curriculum.

The PDET program is exceptionally balanced. Each student in the program takes as many credit hours from the College of Arts and Sciences as they take within the program. When combined with other coursework outside the program but within the College of Technology, the PDET graduate has a much less narrow base of knowledge relative to other Engineering or Engineering Technology graduates.

The program is also designed for flexibility. One of the few true on-campus and off-campus program combinations that has been successful in the Grand Rapids market, Product Design has also developed a notebook PC based program that allows any classroom to integrate computer technology into any class format. This keeps laboratory costs low while still retaining a high level of hands-on learning.

Resources.

The Product Design program uses a single classroom in the Swan building. It uses no computer laboratories or supporting infrastructure. While resources are functionally adequate, the classroom temperatures in this room with student PCs in operation and with little ventilation are frequently unacceptable in early fall or late spring. An additional deficiency in facility resources is the lack of studio space for PDET senior project development. Currently the required prototyping for these projects is done at the student's home or in other borrowed space. The lack of access to a work area is highly inconvenient to PDET students and limits their ability to produce acceptable models and prototypes.

Admissions standards.

The Product Design program has maintained a commitment to being 'transfer friendly'. All program entrance requirements can be completed at any of the 28 Michigan community colleges or as part of any two year program within the College of Technology. Mathematics, science and communications entrance requirements, while set to a minimum level adequate to provide a good chance of program success, are vigorously enforced. This means that each year a number of students are rejected for admission. The validity of the program admission standards are indicated by the extremely high graduation rates for the program and the success of its graduates.

Degree of commitment by the administration.

The small size of the PDET program, its minimal funding and facility requirements have created a low level of awareness of the program within the college and university administrations. The program also operates with little visibility because of the chair structure and the lack of available time on the part of the program faculty to lobby for increased exposure. Overall however, the PDET program needs and receives little administrative support. The failures of the various levels of FSU administration regarding the program are those of omission. Because of a lack of knowledge about the program, it receives little promotional support from university and/or college marketing. No advertisements expose potential students to the PDET program and it remains well below the surface of the internet. At times, support in terms of funding has been offered for programmatic marketing. Unfortunately the PDET faculty is not adequately trained as a marketing organization and students primarily find the program by direct referral. While qualified students who find and contact the program typically enroll, many other qualified students are likely to have never discovered it.

A second level of concern is the administration's willingness to create duplicative programming. The creation of the BS MET program effectively eliminated the source of over 50% of PDET program enrollment. In addition the willingness of the administration to allow the development of Bachelor of Applied Science (BAS) degrees at satellite locations has led to the promotion of these low cost, marginal content programs at the expense of existing on-campus programming and the diversion of some students from on-campus programs. The effect of these administrative decisions has led to a decrease in PDET program enrollment and may eventually threaten the viability of the program.

PDET program processes and procedures.

The Product Design program stresses the advising process and the management of block scheduling that prioritizes program courses below that of other required courses. This means that a clear two year path to a PDET degree is always present. While this does not insure that all students graduate in a timely manner, it does mean that all PDET students understand program requirements and that is possible to meet those requirements if they choose to do so. The success of this approach is evidenced by the very high program graduation rate.

Current requirements from the workplace are continually used to modify the content of Product Design courses. In addition, close coupling with those industrial partners who typically provide employment opportunities for program graduates have been a continuing priority. PDET senior projects are reviewed and evaluated by industrial representatives. Program presentations and design activities are configured to parallel similar processes currently used in industry. PDET program faculty are required to possess extensive industrial experience and to have an educational background that is technically appropriate and developed, at least in part, at other educational institutions.

Other relevant perceptions.

It is perceived that the Product Design program is unique in what it provides the college and the university. With a higher level of awareness and additional administrative support in the areas of improved facilities and program promotion, the program could provide a larger level of benefit as well as providing a model to be used in revising the curriculum of less productive and less progressive programs.

Perceptions of William Koepf
Assistant Professor of Product Design Engineering Technology

Overall perceptions regarding the PDET program.

The Product Design program at Ferris State University is very unique. I know of no other program that exposes students to such a wide range of engineering topics. This diversity gives the students the opportunity to find careers in many different industries.

The capstone project in the Product Design program does more to provide the student with a real world engineering challenge than any I have seen or heard of from any other school or program. Faculty from other universities have commented on the stringent requirements of the project and are amazed that the content of the final report was the culmination of a single student's effort in one semester. The students are given the outline of what is expected but the content, evaluation and detail of the report are up to the student. Past students from several industries have commented on how relevant they have found this experience to be to real world engineering projects.

I am proud to be a part of the Product Design Engineering Technology program at Ferris and look forward to its continued success.

Curriculum.

The Product Design curriculum was and is developed though the combined efforts of the faculty, students, alumni, and advisory board. The curriculum is dynamic in that it is continually evolving to meet the demands of various industries. With technology changing rapidly, it is crucial that the curriculum stay up to date. Those who have been in the program before me have set the curriculum up to have a blend of theoretical course work and practical application. When students leave this program they know how to do something. They also know what it takes to develop and explore new theories.

I am grateful to those who work with me in the development and alteration of existing courses. I have updated or developed much of the content in many of the courses that I have been involved with. This flexibility is crucial to the success of our students.

In addition, the Product Design curriculum has been expanded to offer several service courses that have been jointly developed with other programs. Many of the students have selected the PDET 322, 3-D Modeling and Prototype course for a technical elective. As a result, the content for the Non-PDET sections has been altered to provide students with little or no design background a fundamental understanding of what it takes to design and develop a product.

A PDET 190 course is currently being developed through the input of the Manufacturing and Tooling Technology programs. It will cover a range of topics such as engineering graphics, geometric dimensioning and tolerancing, and 3-D modeling. It is intended to expose the student to the basics of each topic and understand how they are interrelated. Several students from other programs have utilized the skills acquired in the service courses in their semester projects.

Resources.

The Product Design program uses very little resources. All of the resources I have required have been met through by the Product Design program budget.

Degree of commitment by the administration.

In the past, the influence of the administration has not had a large impact on the PDET program. I feel this is largely due to the lack leadership at the Deans level. Currently, I feel very positive about Dean Oldfield

and his commitment to the College of Technology. He has already been involved more with the PDET program than any Dean before. I look forward to the support of the administration in the future.

PDET program processes and procedures.

I must give a great deal of credit regarding the smooth operation of the Product Design program to Rich Goosen. He has set-up and handled many of the procedural aspects of the program that ensure its success. For example, the methods for advising students he has developed ensure the students success in obtaining the courses they require and leave little room for doubt as to what is required of them. I have simply followed this outline. Although I have not been in charge of many of the procedural aspects of the program, Mr. Goosen has sought my input and ideas and I feel I have been a contributing member of the program.

When I first interviewed for the position in the PDET program, it was explained that I would need to get a master of science degree from another institution and that it needed to be relevant to my field. I chose the Engineering Management Masters at Western Michigan University. The experience and relevance of this program to my career at Ferris has been invaluable. It was a difficult road but the results were worth it. Not only has it allow me to view our program has a process and therefore look for opportunities for improvement, but it has also allowed me to be successful in industry as well. I have been able to consult has a Quality Systems Manager which has helped me keep current with the plastics industry.

The PDET program has a procedure that students are required to purchase a laptop/notebook computer prior to entering the program. It is my perception that this has been an invaluable tool for the students. The majority of the students respond in our survey that they would not have it any other way. It is an additional expense but one that is justified in the end. Many students like not being tied to a computer lab. I enjoy the freedom it allows me to give assignments without having to worry about scheduling additional lab time. In addition, most students use their laptop for many other courses throughout the program. It is also note worthy that the College of Technology, through discussions with the PDET program has implemented wireless receivers in the PDET room. It is my perception that this technology along with the PDET laptop requirement is the next phase of technology that will be implemented across campus.

Other relevant perceptions.

I believe the next phase of growth for the Product Design program is tied directly to facility needs. If we are to become the premier Product Design curriculum in the nation, we need a facility that represents this mission. It should be outfitted with the latest projection technology for our 3-D modeling classes, it should have a lab and equipment that will allow our students to test and verify some of the theory they are taught in classes such as Statics and Strength of Material, Thermodynamics, Machine design and Kinematics. It should have a student resource center that is designed with the creative stimulation of new product development in mind. The PDET program is said to bridge the gap between art and engineering. A facility that emulates the creative and mathematical processes required of the Product Design Engineering Technology program is the key to our growth. This is my perception.

SECTION 2 F

COLLECTION OF PERCEPTIONS - ADVISORY COMMITTEE PERCEPTIONS

The Product Design Engineering Technology program Industrial Advisory Committee (IAC) is composed of individuals having a variety of associations with the program. The current board is composed of both program graduates and non-graduates, representatives of both the on-campus and off-campus programs and has both male and female members. Current members of the board with titles and relevant backgrounds are;

Joy Battey, Senior Product Engineer, Steelcase, Inc.. Member since 2005. Graduate of off-campus PDET program in 1997.

Jerry Redmann, President, Savant Automation. Member since 1996. BS Western Michigan University, Mechanical Engineering, MA Aquinas College, Management.

Brett Kooistra, Automotive Group Manager, Fredericks Design. Member since 1999. Graduate of on-campus PDET program in 1994.

Steve Finney, Director of Manufacturing and Engineering, Irwin Seating, Inc. Member since 2005.

Renee Rimer, Global Airbag Supression Lead, General Motors, Member since 1999. Graduate of on-campus PDET program in 1996.

Lance Myers, Design Engineer, Symbiote, Inc., Member since 1999. Graduate of off-campus PDET program in 2000.

Don Eenigenburg, Engineering Director – Test & Operations, Smiths Instruments. Member since 1996. BS Michigan Technological University.

Wil Gooch, Military/Marine Product Engineer, Blackmer Pump. Member since 2005. Graduate of off-campus PDET program in 2003.

Tina DeKievit, Mechanical Designer, Stevens Design and Fabrication. Member since 2005. Graduate of off-campus PDET program in 1998.

Bill Gerding, Project Engineer, AAR Mobility Systems. Member since 1996. Graduate of on-campus PDET program in 1995.

The most recent meeting of the IAC was held in September of 2005. The meeting was attended by the PDET program faculty and nine of the ten committee members. Notes of this meeting are provided in Appendix B. In order to solicit the evaluations and suggestions of committee members, a short confidential survey was administered to committee members. A copy of this survey is provided in Appendix B. Completed surveys were submitted by six committee members. The responses submitted via this survey instrument were as follows;

Q1 – Question 1. This was a five part question designed to obtain committee input on the PDET program curriculum. Responses were solicited in six areas. For each area of interest the IAC member was requested to respond using a scaled response. Response options were then encoded in order to provide a numeric value. Responses were encoded on a 1 to 5 scale, with 1 designated as ‘Strongly Disagree’, 2 as ‘Somewhat Disagree’, 3 as ‘Somewhat Agree’, 4 as ‘Strongly Agree’ and 5 as ‘Not Sure’. To identify the courses with the most extreme evaluations, the mean response value for each subject area was calculated. Using this information, reflected in the following table, the areas with the highest (mean score) and lowest (mean score) levels of support are identified.

CURRICULUM EVALUATION

	N	Minimum	Mean
Content	6	3	3.83
Knowledge	6	3	3.83
Equipment	6	4	4.00
Practical	6	4	4.00
Facilities	6	3	3.00
Project	6	3	3.67
Valid N (listwise)	6		

Content. Statement: "*Instructional content reflects what is needed to be successful in today's workplace."* Five of six responding IAC members strongly agreed with this statement.

Knowledge. Statement: "*Instructors possess knowledge of, and teach, current practices."* Five of six responding IAC members strongly agreed with this statement.

Equipment. Statement: "*Instructional equipment is adequate for the instruction provided."* All six responding IAC members strongly agreed with this statement.

Practical. Statement: "*The PDET program provides students with practical skills and knowledge experiences."* All six responding IAC members strongly agreed with this statement.

Facilities. Statement: "*Instructional facilities are conducive to learning."* All six responding IAC members somewhat agreed with this statement.

Project. Statement: "*The Senior Project is an effective assessment tool."* Four of six responding IAC members strongly agreed with this statement. Two members somewhat agreed with the statement.

Q2 – Question 2. This was a five part question designed to obtain committee perceptions regarding the preparation of PDET program graduates for the workplace. Responses were solicited in five areas. For each area of interest the IAC member was requested to respond using a scaled response. Response options were then encoded in order to provide a numeric scaled response. Responses were encoded on a 1 to 5 scale, with 1 designated as 'Strongly Disagree', 2 as 'Somewhat Disagree', 3 as 'Somewhat Agree', 4 as 'Strongly Agree' and 5 as 'Not Sure'. To identify the courses with the most extreme evaluations, the mean response value for each subject area was calculated. Using this information reflected in the following table, the areas with the highest (mean score) and lowest (mean score) levels of support were determined.

PROGRAM GRADUATE EVALUATION

	N	Minimum	Mean
Performance	5	3	3.80
Contribution	5	4	4.00
Preparation	5	4	4.00
Placement	5	3	4.00
Jobs	6	3	3.50
Valid N (listwise)	5		

Performance. Statement: "*Ferris PDET grads are comparable in performance to grads from other institutions."* Four of five responding IAC members strongly agreed with this statement.

Contribution. Statement: "*Ferris PDET grads contribute as much as other grads in their first 6 months of employment."* Five of five responding IAC members strongly agreed with this statement.

Preparation. Statement: "*Ferris PDET grads are well-prepared to enter the workforce"* All five responding IAC members strongly agreed with this statement.

Placement. Statement: "*Adequate placement assistance is provided to graduates."* Only one of five responding IAC members strongly agreed with this statement. Two members somewhat agreed and two members were not sure.

Jobs. Statement: "*There are job opportunities available for Ferris PDET grads."* Three of six responding IAC members strongly agreed with this statement. Three IAC members somewhat agreed with this statement.

Q3 – Question 3. This question asked the IAC member is they could recommend any alternative assessment tools that could be used in conjunction with the Senior Project. An affirmative response was requested to identify any such alternatives as Question 4. Four of six responding IAC members could not recommend an alternative assessment measure and two members were not sure.

Q4 – Question 4. No responses regarding assessment alternatives were submitted.

Q5 – Question 5. This question asked IAC respondents to recommend changes for the PDET Senior Project assessment instrument. Submitted responses were;

1. *I think this is excellent opportunity for ENG to learn about design process*
2. *Companies could contribute actual projects. Did this for Western Mich.Univ*
3. *I understand but was disappointed to hear the decrease in electronics instruction content*
4. *I believe it has evolved quite well and is an appropriate assessment tool and student learning device*
5. *None so far*
6. *I never write a report like that for a design project. It's so writing intensive, Id like to see more focus on technical drawings or CAD*

Q6 – Question 6. This question asked IAC members to suggest courses to be added to the existing PDET program. Submitted responses were;

1. *Conceptual development (maybe not as a course but within requirement of existing course). Generate idea (render sketch). Model-Proto, etc.*
2. *A course that was updated every year with real world applications that students can be more well rounded and current to today's workforce*
3. *More information on Machine contrasts would have been helpful*

Q7 – Question 7. This question asked IAC members to suggest courses to be eliminated from the existing PDET program. Submitted responses were;

1. *None*
2. *Psyc 326 – not useful to me at all*

Q8 – Question 8. This question asked IAC members to suggest changes for the existing PDET program. Submitted responses were;

1. *None so far*
2. *Upgrade the Basic Art to a drawing class specific to Product Design*

Q9 – Question 9. This question asked for an overall evaluation of the PDET program. Three of six responding IAC members indicated that they thought the PDET program was excellent as it is currently

with no changes required. The remaining three respondents indicated that they thought the PDET program was good as it is currently but could be improved by some minor changes.

Q10 – Question 10. This final survey element provided space for responding IAC members to make any additional comments on the PDET program and/or the committee meeting. Submitted responses were;

1. *Faculty seems sincere and interested in the quality of the program and the quality of the Grad's produced. Positive aspect = continue to look for improvements. During the year, how can we help as advisors? Any needs?*
2. *Accolades go to Rich and Bill because I think the program is very dependent on you and you have done very well*
3. *The PDET Advisory Board discussed methods to more effectively promote the program and various means to better differentiate it from the FSU MET program. I believe these issues and the suggested actions related to them have great merit. Further, I think that updating the main PDET classroom will lead to improved learning via a more efficient and comfortable student environment.*
4. *Glad to be here. It feels good to be asked for your input.*
5. *Here is an idea that may increase awareness of the technical program at Ferris. I was talking with my sister-in law, who is a guidance counselor at a Christian high school in Hamilton Ontario. She has been invited to a conference at Calvin College where they discuss all of the opportunities at Calvin. Perhaps the entire school of Technology could host a similar event for Junior college guidance counselors to let them know about the transferable programs for their students.*

SECTION 3

PROGRAM PROFILE

The most recent Administrative Program Review (dated 9/26/05) is included in Appendix C.

A. PROFILE OF STUDENTS

The Product Design Engineering Technology program, designed as a 3rd and 4th year (+2) program, has only upper division students. In addition to the on-campus student body there is an off campus component of the program offered in Grand Rapids at the Applied Technology Center (ATC) in an evening format which takes approximately three years of year round attendance to complete. Because of several changes in identifying off campus students and a small degree of mixing created by mid-program transfers between Big Rapids and Grand Rapids, the separation of PDET students into off campus and on-campus groups is not precise. An additional area of uncertainty is the number of Grand Rapids students who are enrolled in the program. Active enrollment of these students is based on students who have taken at least one FSU course in the previous semester. For off-campus students who must complete some course work at Grand Rapids Community College and who often are forced to interrupt their education because of employment or family conflicts, the actual number of students enrolled in Grand Rapids is typically under-estimated.

Institutional data regarding gender, home location, employment location, race/ethnicity and age has not been provided to the program but all indications are that an overwhelming number of PDET students are white/caucasian males who come from within Michigan and who typically stay in Michigan after graduation. With rare exceptions, on-campus PDET program students are enrolled full time and begin the program immediately after completing two or more years in a two year program either at FSU or a Michigan community college. Off-campus students in Grand Rapids typically take one or two courses per semester on a part time basis and begin the program after a break in their education. Off-campus students also have typically completed an Associates Degree either at FSU or a Michigan community college.

The PDET program provides the same instructional content (usually taught by the same instructors) to students completing the program in Grand Rapids as that provided to on-campus students. Since the on-campus and off-campus programs are largely asynchronous due to different start times and the number of semesters needed to complete the program, program changes are difficult and take significant time to fully implement. In addition, the off-campus program, with students in some cases taking six years or more to complete the program, requires absolute consistency in academic advising. In order to provide this consistency, a single PDET faculty member provides all academic advising to Grand Rapids students.

In order to develop additional detail regarding on-campus PDET student characteristics, a data base was developed for the program using information taken directly from SIS+. The students included in this database were all students completing the PDET 311 Seminar course beginning with fall 1993. Since the PDET on-campus entry point is only in fall semester and all PDET students must take this course in their initial fall semester on campus, this course is an effective point to monitor actual enrollment and entrance into the program. The initial enrollment for the PDET program was in fall 1988 with the initial class graduating in winter 1990. The database was limited to classes starting in fall of 1993, however, because this was the first class entering under a semester rather than quarter credit hour format. The end point for this database was the end of winter semester 2006 and includes the last SIS+ data before BANNER implementation. The net content of the resulting data base includes all on-campus PDET students except those students graduating in the first 5 graduating classes (1990 thru 1994). Using the data from graduation years 1995 through 2006, the data base provides actual data for 11 of 16 graduating classes (69%). There are no known reasons that the students included in this data base would not be representative of all on-campus PDET students in any class year. Procedurally, the data base was hand entered and verified for each student. The resulting information, reflecting a record for each of 302 students, was then analyzed using MS EXCEL and SPSS software. Where appropriate and/or where other institutional data was not available, this 93-06 subset of on-campus students was used for analysis. It should be noted that because of

the volatility of the off-campus student population, the development of a similar database for these students was not feasible. A sample page of the 93-06 data base in MS EXCEL showing the first 41 of 302 student records is provided in Appendix C.

Employability of Students

Product Design program graduates have record of success in the workplace. Placement data provided by the FSU Student Employment & Services Office reflects reportable data over the period of this review and indicates a 100% placement rate as reported by program graduates. Figure 3.1 provides an overview of starting salaries as reported between 1994 and 2004 (the most recent year data is available).

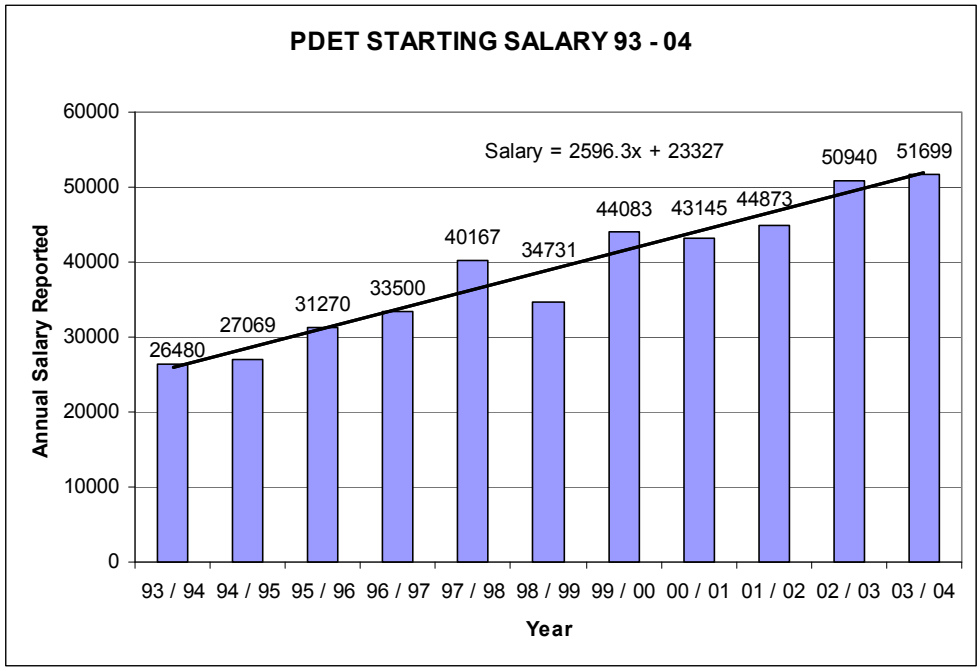


Figure 3.1

The trend analysis indicates that the starting salary of PDET graduates has nearly doubled in the last 10 years with a typical linear increase of approximately $2600 per year. Detailed data from the most recent 2003/2004 survey indicates the average starting salary for PDET program graduates is the 4th highest of 18 BS degrees offered by the College of Technology and 6th highest overall for FSU (behind Pharmacy, Optometry, Manufacturing Engineering Technology, Plastics Engineering Technology and Welding Engineering Technology). The average starting salary for PDET graduates exceeds all reported starting salaries from the Colleges of Education, Business, Allied Health and Arts & Sciences.

B. ENROLLMENT

Current enrollment statistics as provided by the *FSU 2005-06 Fact Book* are shown in the following table.

MECHANICAL DESIGN DEPARTMENT	**2001/02**	**2002/03**	**2003/04**	**2004/05**	**2005/06**
Product Design Engineering Technolgy					
On-Campus	52	48	46	32	36
Off-Campus	42	38	38	36	25

Students apply and are enrolled in the PDET program on a 'rolling' basis. Typically students apply in the winter preceding a fall admission date. As discussed previously, data regarding off-campus students has limited accuracy.

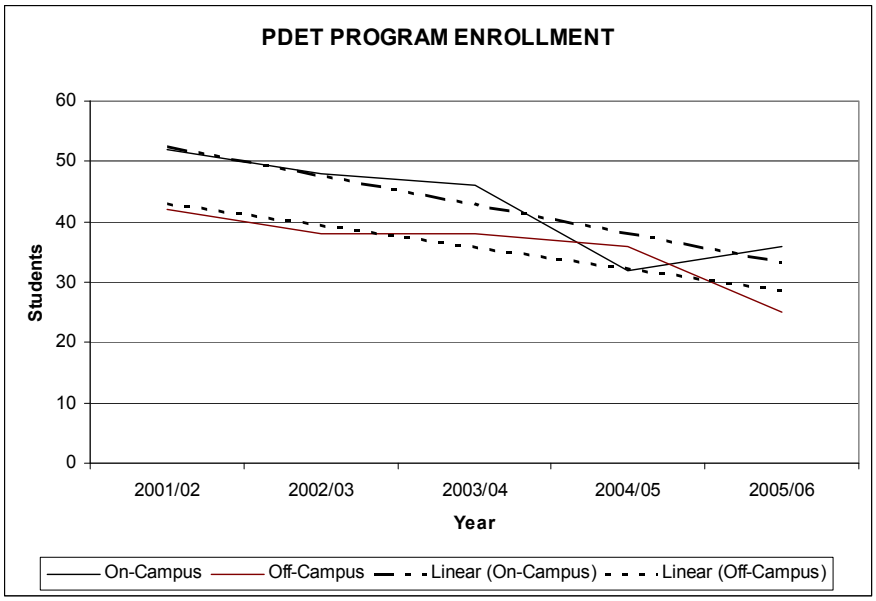


Figure 3.2

The program enrollment data shown in figure 3.1 indicates a declining trend in program enrollment. Expanding the data field to include the enrollment figures as reported in the 2000 program review (see figure 3.2) the recent nature of this trend is more obvious.

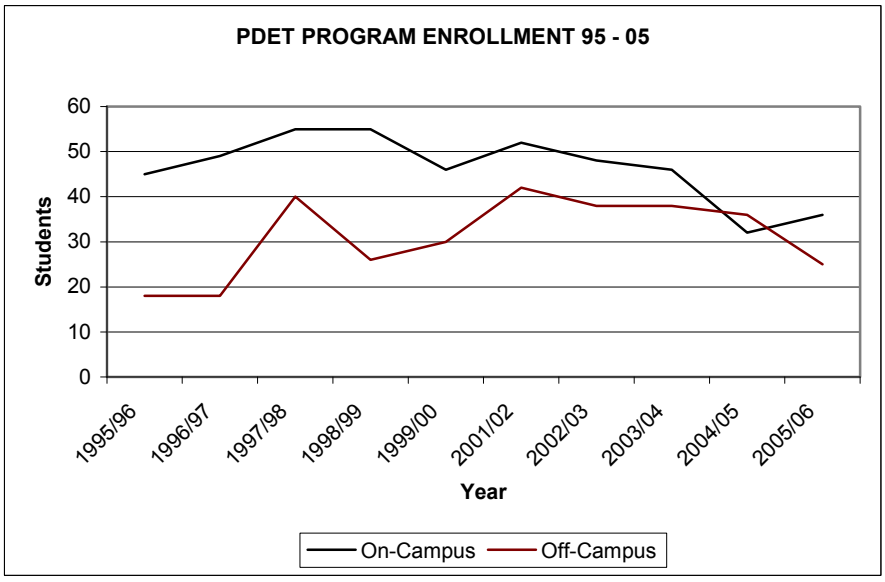


Figure 3.3

There are several probable reasons for the deterioration in program enrollment. Three of the most significant are likely to be:

1. Limited program promotion. Transfer students are a critical component of on-campus enrollment. Currently most transfer students choose the PDET program because of a personal referral, the

recommendation of a faculty member from a sourcing community college or as the result of 'discovering' the program via advertisement or internet search. Of these paths the PDET program has no printed, program specific, promotional information and very low internet search visibility[1]. In addition direct personal contact with community college faculty in typical sourcing programs has been minimal.

2. Development of duplicative programming. In 2003 Mechanical Engineering Technology was approved to offer a BS in that specialty. The differences between the new BS MET and the BS PDET degree are real, but subtle to the prospective student, with the 'mechanical engineering' label creating a more recognizable image than 'product design'. Specific courses used for the new degree were adequately similar for the new program to be able to use a number of existing PDET program courses as part of the new BS MET curriculum. Since the BS MET program is coupled to a pre-existing AS MET two year degree program, it is, in effect, a 0 to 4 year program. There is little appeal for a student successfully completing the first two years to make a change to an alternative and apparently equivalent BS program. The creation of the BS MET degree therefore created a rapid reduction in the transfer of two year mechanical students into the PDET program and a severe drop in this historically important PDET enrollment source (23.2% of new students, see figure 3.1).

NEW STUDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	FSU AUTO	2	.7	.7	.7
	FSU CDTD	77	25.5	25.5	26.2
	FSU MET	70	23.2	23.2	49.3
	FSU PLTS	3	1.0	1.0	50.3
	Transfer	139	46.0	46.0	96.4
	FSU T ILL	10	3.3	3.3	99.7
	FSU WELD	1	.3	.3	100.0
	Total	302	100.0	100.0	

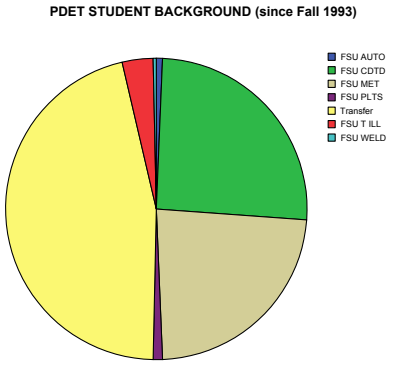


Figure 3.4
PDET On-Campus Enrollment Sources 1993 – 2006

3. Development of alternative off-campus programming. Although the enrollment data shows less of a declining trend for off campus students, recent indications are that a more severe decline is likely. The primary cause of off-campus enrollment decline in Grand Rapids is thought to be linked to the development of new FSU GR based programs, most notably the BAS degree in Industrial Technology & Management. This BAS degree offers a less structured and less demanding path to a Bachelors degree than the PDET alternative. This easier path has diverted a portion of off-campus students that otherwise would be attracted to enroll in PDET. In addition the academic advisors on staff in Grand Rapids are likely to actively promote native FSU GR degree programs at the expense of FSU BR programs such as PDET.

To improve PDET program enrollment, the program needs to focus on transfer student opportunities to benefit overall on-campus enrollment. Internal FSU transfers should be considered only as incremental

[1] Currently FSU PDET does not appear within the first 10 pages of a 'Google' search for Product Design.

enrollment since these existing students, while contributing to program enrollment, do not benefit university enrollment performance. Since the recently created BS MET program provides a more difficult transfer path requiring the completion of various specific lower division program courses prior to admission, the more general PDET entrance requirements are more attractive to external transfer students. To reverse the downward enrollment trend in on-campus enrollment, the program needs to increase marketing activities to reach and attract community college transfer students. With respect to off-campus enrollment trends, there is little any program based in Big Rapids can do to match the effectiveness of the resident advisors in Grand Rapids and an academically less demanding curriculum. The long term success of the Grand Rapids PDET program will therefore be determined on the long term benefits of the PDET degree program within the workforce as a more attractive degree path when compared to the BAS and other FSU GR degree programs.

C. PROGRAM CAPACITY

Within the College of Technology, laboratory content classes are limited by available laboratory capacity. This capacity is typically 15 students. The PDET program is not limited to an available number of computer work stations since all PDET students are required to provide their own notebook computer. As the result of the 2000 Academic Program Review, the PDET program installed modular student work places in the program's home classroom in 301 SWN. The furnishings in this room (with power outlets) create an effective maximum capacity for most PDET classes of 25 students. The facility space available to the PDET program does not currently limit program enrollment.

D. RETENTION AND GRADUATION

The official number of degrees conferred for the PDET program according to Institutional Research & Testing as presented in the *FSU 2005-06 Fact Book* is as follows;

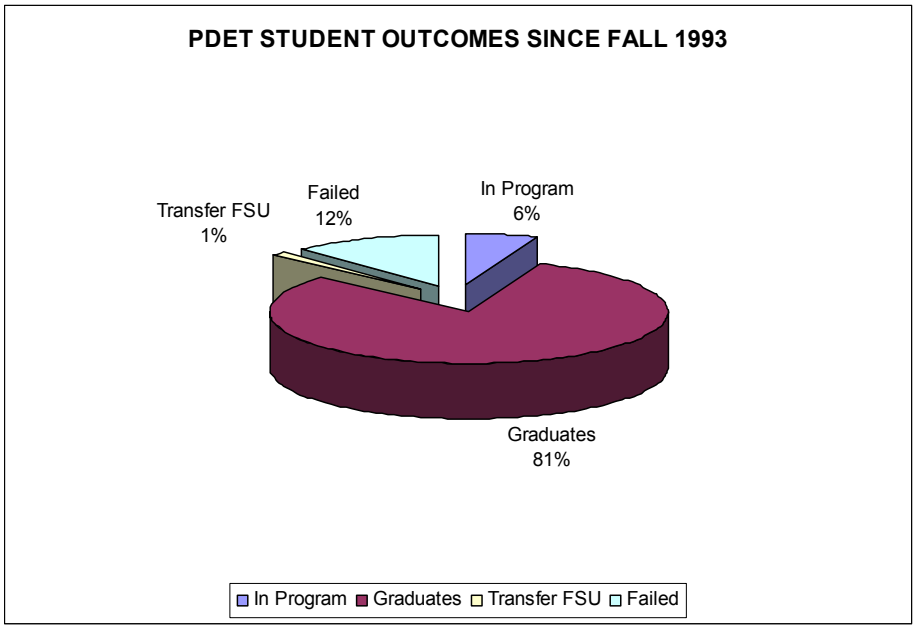
Year	2002/03	2003/04	2004/05
Degrees	35	30	23

The number of degrees includes both on-campus and off-campus students. Retention information was not readily available at the program level. The report, *Retention and Graduation Rates Freshman & Transfer Cohorts Fall 1995 to Fall 2004* by FSU Institutional Research and Testing (IR&T), does state 6 year graduation rates for the Design Manufacturing and Graphics Arts Department (DMGA), containing the PDET degree program, for the class entering in fall 2000 to be 54%. In addition the same reference states an overall 75% graduation rate (university wide) for full time transfer students entering four-year degree programs in fall 2000. Attempts to determine PDET program specific rates through FSU IR&T (including internal and external transfers as well as on-campus and off-campus students) was unsuccessful, resulting in the determination of a 100%, six year graduation rate for the PDET program based on a single student.[2]

In an attempt to provide PDET program specific graduation and retention information with actual validity, the data base referred to in Section 3A was used to develop additional information. The database used was hand entered from SIS+ information and provides data from all on-campus PDET students from graduation years 1995 through 2006, representing 11 of 16 graduating classes (69% of graduating classes). Including the most recent information available, this database provides a comprehensive and representative view of PDET program students. Processing the information from this database using MS EXCEL and SPSS software an overview of the following measures were developed;

[2] This student could not be identified by name from IR&T records.

1. PDET Graduation Rates.



Students Entering (Fall 1993 – Fall 2005)	302
In Program (class of 2007)	18
Graduates (Winter 2005 – Winter 2006)	244
Transferred to other FSU degree program	3
Failed - not taking classes & not graduated	37

Figure 3.5

As indicated by Figure 3.5, 244 of the 302 students entering the on-campus PDET program since fall 1993 had graduated by winter 2006. Three students had transferred to other FSU degree programs and 18 have completed their 3rd year and expect to graduate from PDET in winter 2007. Based on this data, a valid graduation rate for the PDET program would be 244 of 281 students (37 + 244 = 281) or 86.9%.

2. PDET student performance by semester credit hour.

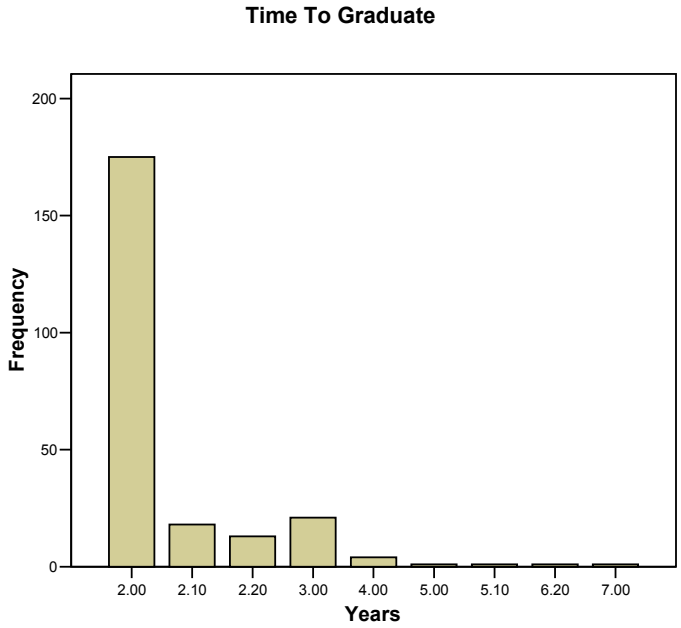
Descriptive Statistics

	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SCHatStart	235	46.00	193.80	79.7094	17.51367	1.813	.159	7.788	.316
SCHatEnd	235	108.00	250.80	144.7754	15.85458	1.879	.159	8.956	.316
SCHinPDET	235	26.99	95.00	65.0660	9.79639	-.076	.159	1.886	.316
Valid N (listwise)	235								

The table shows that of 235 graduating PDET students evaluated, the average number of credit hours at program entrance was 79.7 SCH with minimum of 46 SCH and a maximum of 193.8 SCH. The admission requirement to the PDET program is typically 60 semester hours minimum and the 46 SCH shown was created by a student who began the PDET program before a complete transfer of credit hours from a prior institution had occurred. The average number of credit hours at the time of PDET program graduation was 144.8 SCH reflecting a net of 65.1 SCH taken between entrance and graduation. Referring to the PDET Program Checksheet provided in Appendix C, this total is consistent with the 65 SCH defined by required

program courses. It should be noted that 9 student records were eliminated from the 244 program graduates resulting in 235 records analyzed for SCH performance. [3]

3. PDET student performance by time to complete.



Years to Graduate[4]	Frequency	Percent	Valid Percent	Cumulative Percent
2.00	175	74.5	74.5	74.5
2.10	18	7.7	7.7	82.1
2.20	13	5.5	5.5	87.7
3.00	21	8.9	8.9	96.6
4.00	4	1.7	1.7	98.3
5.00	1	.4	.4	98.7
5.10	1	.4	.4	99.1
6.20	1	.4	.4	99.6
7.00	1	.4	.4	100.0
Total	235	100.0	100.0	

Figure 3.6

Figure 3.6 indicates that of the 235 student records evaluated, 74.5% of PDET students complete and graduate from the PDET program two years from the time that they enter. After two semesters (summer and fall) beyond the planned two year program duration (typically the end of fall semester of their

[3] The nine graduates who were not included were eliminated because their student records exhibited a starting point inconsistent with the measures used in this evaluation. Because they took their introductory seminar class at some point other than the start of their PDET program these records could not be readily compared with those of other PDET graduates. An examination of these student records did not, however, indicate any actual performance difference relative to the other graduates.

[4] For this table 2.00 = 2 years, 2.10 = 2 years + 1 semester (9 semesters), 2.20 = 2 years + 2 semesters (10 semesters), etc.

graduation year) 87.7% of PDET graduates have completed their program of study. By one year after their planned program completion date, 96.6% of PDET graduates have completed the program.

E. ACCESS

The Product Design program has been offered in an off-campus format at the Applied Technology Center in Grand Rapids since 1990. This has allowed a significant number of working professionals to complete a PDET degree by attending classes two or three evenings per week with most general education requirements met by taking Grand Rapids Community College classes. In addition the off-campus PDET option is appealing to FSU students who have been forced to enter the workplace after completing a two year degree program. All classes have the same content and, in many cases, the same instructor as the on-campus program. Academic advising is provided to off-campus PDET students at the ATC at least one evening per month.

F. CURRICULUM

The current PDET program curriculum is described by the check sheet provided in Appendix C. There has been one significant change in the program curriculum since the last Academic Program Review in 2000. One course, HSET 403, a 3 lecture hour, 3 laboratory hour, 4 credit hour course in mechanical testing, was replaced by PDET 415, a one lecture hour, 3 laboratory hour, 2 credit hour course in advanced CAD solid modeling. This change was made to provide PDET program graduates with additional CAD experience and was initiated by the program's Industrial Advisory Board. This change reduced the number of required semester credit hours in the program from 67 to 65 hours.

The following is a summary of the current PDET course requirements classified as program, other College of Technology and non-College of Technology according to the source of the course.

PRODUCT DESIGN ENGINEERING TECHNOLOGY - Fall 2006

PDET	CH	Lec	Lab	Other COT	CH	Lec	Lab	non-COT gen ed	CH	Lec	Lab	non-COT other	CH	Lec
PDET311	1	1	0	EEET201	3	2	2	ARTS101	3	3	0			
PDET312	2	1	3	MECH340	4	4	0	CHEM103	3	2	3			
PDET 321	3	3	0	MFGE352	2	2	0	PSYC150	3	3	0	MATH216	4	4
PDET 322	2	1	3	PLTS342	3	3	0							
PDET411	3	3	0	MATL341	3	3	0	ENGL321	3	3	0			
PDET413	3	3	0											
PDET412	2	2	0											
PDET415	2	1	2											
PDET499	3	2	3					PSYC326	3	3	0	COMM336	3	3
PDET422	4	3	3					CE200+	3	3	0			
TOTALS	**25**	**20**	**14**		**15**	**14**	**2**		**18**	**17**	**3**		**7**	**7**
%	38%	34%	74%		23%	24%	11%		28%	29%	16%		11%	12%
PROGRAM TOTALS	**65**	**58**	**19**					**TOTAL non-COT**	**25** 38%	**24** 41%	**3** 16%			

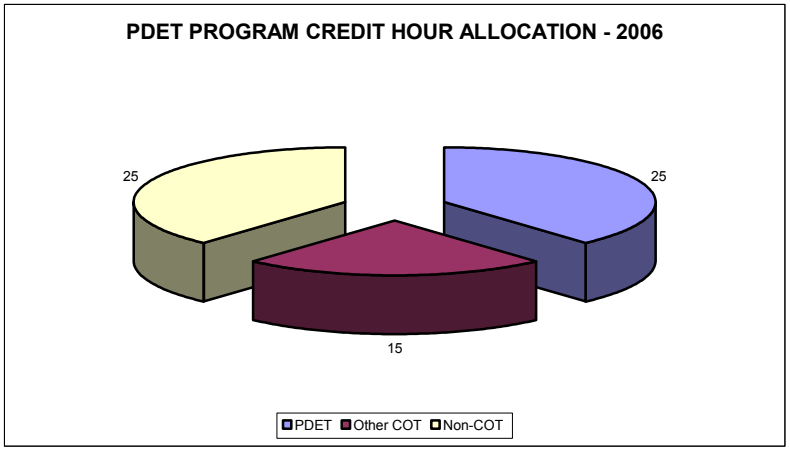


Figure 3.7

Figure 3.7 indicates that the Product Design Engineering Technology program has a relatively high degree of balance between program and non-program course requirements. Of the 65 credit hours currently in the program, only 25 hours (38%) of PDET prefix courses are required. The number of credit hours required from outside the College of Technology (from the College of Arts and Sciences) is an identical 25 hours. In addition, each PDET student contributes 15 semester credit hours to other College of Technology programs.

G. QUALITY OF INSTRUCTION

The overall assessment of the quality of instruction offered by the PDET program as evaluated by current students and alumni is generally very positive. More detail on these assessments can be found in Section 2 of this report. The PDET Industrial Advisory Board has not reviewed actual classroom instruction and therefore has made no assessment of this metric.

The most unique aspect of instruction within the Product Design program is the innovative use of student owned notebook computers within PDET classes. It was the first program at FSU to require all students in the program to have direct access (typically ownership) of a notebook computer by the start of their second semester in the program. This requirement has been well received by PDET students and a longitudinal evaluation of PDET student perceptions regarding the requirement, as measured by multiple program level student evaluations made since its initiation in the winter of 2001, is available. An example of the information evaluated is shown in Figure 3.8. The use of student owned notebook computers has enabled PDET students to have licensed access to critical CAD software on a year round, 24/7 basis. This level of accessibility has enabled the minimization of extensive laboratory class time allowing greater flexibility for students to schedule classes and to complete required CAD based project work. In addition, accessibility allows self-motivated PDET students to develop a much higher level of skill with the required software than would be possible if their ability to practice were to be limited to classroom time. Additional secondary benefits of the mandatory notebook PC requirement are the development of a higher level of general computer knowledge for PDET students and a sense of ownership / responsibility for the care and maintenance of their equipment.

	2001	2002	2003	2004	2005	Overall
Average	2.0	1.5	1.4	2.1	1.6	1.7
S. Deviation	0.90	0.69	0.86	1.23	0.77	0.93
Responses	34	11	30	14	19	108

Figure 3.8
Longitudinal Data Showing Student Preference for Notebook PC Based PDET Classes[5]

H. COMPOSITION AND QUALITY OF FACULTY

The Product Design Engineering Technology program has two program faculty. Professor Richard Goosen is the senior faculty member and has been teaching in the program since fall 1993. Associate Professor William Koepf is the junior faculty member and has been teaching in the program since fall 2000. Professor Goosen is generally teaches the more analytically based program courses and Associate Professor Koepf teaches all CAD based courses in the program. Both faculty teach outside the program in courses offered by Mechanical Engineering Technology (MECH) and Engineering Graphics (ETEC). A recent resume of each faculty member is provided in Appendix C.

Since the last program review Professor Goosen has been promoted from Associate Professor to Professor and has completed all coursework (36 semester hours) required for the Doctor of Philosophy in Higher Educational Leadership from Western Michigan University. He is an active member in the Institute of Electrical and Electronic Engineers (IEEE), the Industrial Design Society of America (IDSA) and the American Society of Engineering Education (ASEE).

Since the last program review Associate Professor Koepf has been awarded tenure and has been promoted from Assistant to Associate Professor. He completed a Masters Degree (MS) in Engineering Management from Western Michigan University (30 semester hours) in 2004.

[5] The question as presented to the student was; "Overall do you think that PDET classes using student owned laptop PCs are:" The student was presented with the opportunity to provide a scaled response ranging from "1 A good idea" to "5 A bad idea". The data presented therefore indicates that students generally think laptop PC based classes are a good idea.

The workload carried by the PDET faculty, as measured by Student Credit Hour (SCH) generated and the SCH / FTE (Full Time Equivalent Faculty) ratio, is within the top 20% of all College of Technology faculty. Exact comparative ranking is not available from Institutional Research & Testing but an overview of individual PDET faculty output is shown in Figure 3.9.

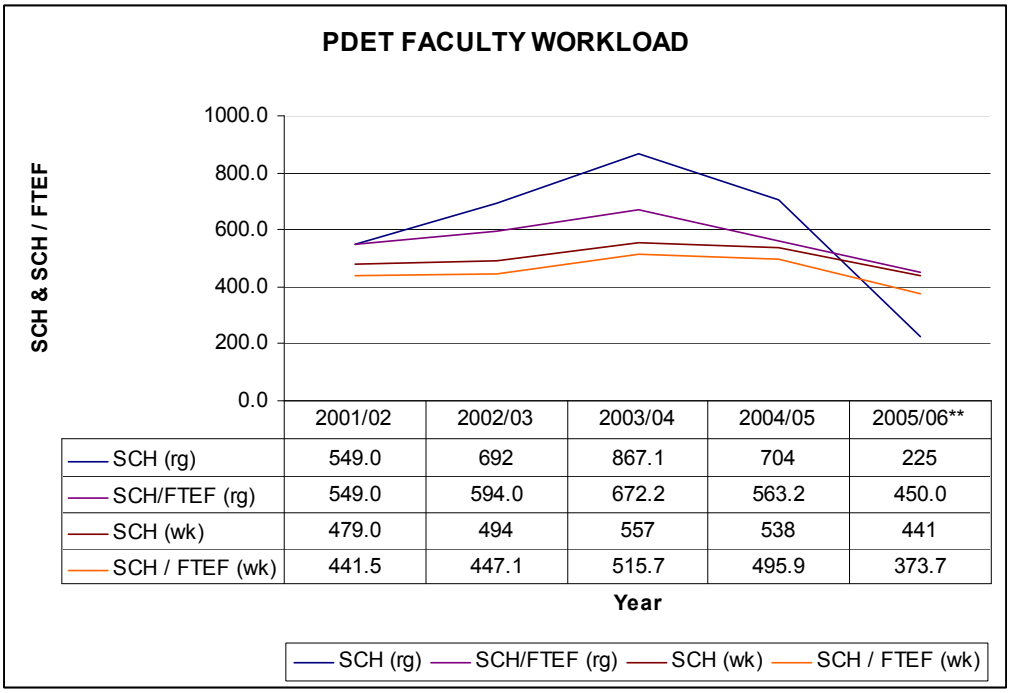


Figure 3.9
Note; Data taken from FSU Annual Faculty Load Reports

Figure 3.9 shows that PDET faculty loading has been relatively constant over the last five years with a slight downturn during the last two years. **It is important to note that for the 2005/06 academic year, Professor Goosen has been serving as Mechanical Design Department (MDSN) Chairperson which includes 75% release time. Average values developed for both faculty members are as follows;

	AVERAGE (RG)***	AVERAGE (WK)	PDET AVERAGE
SCH	703.0	501.8	602.4
FTE	2.4	2.2	2.3
SCH / FTEF	594.6	454.8	524.7

***The data shown for Professor Goosen for the 2005/06 year has not been included in the PDET individual and program averages shown in this table.

I. SERVICE TO NON-MAJORS

The PDET faculty frequently teaches ETEC and MECH prefix courses as part of their assigned loading. In addition the PDET faculty (primarily through the efforts of Professor Koepf) have developed a number of courses offered as electives and directed electives to other College of Technology programs. A summary of these courses is as follows;

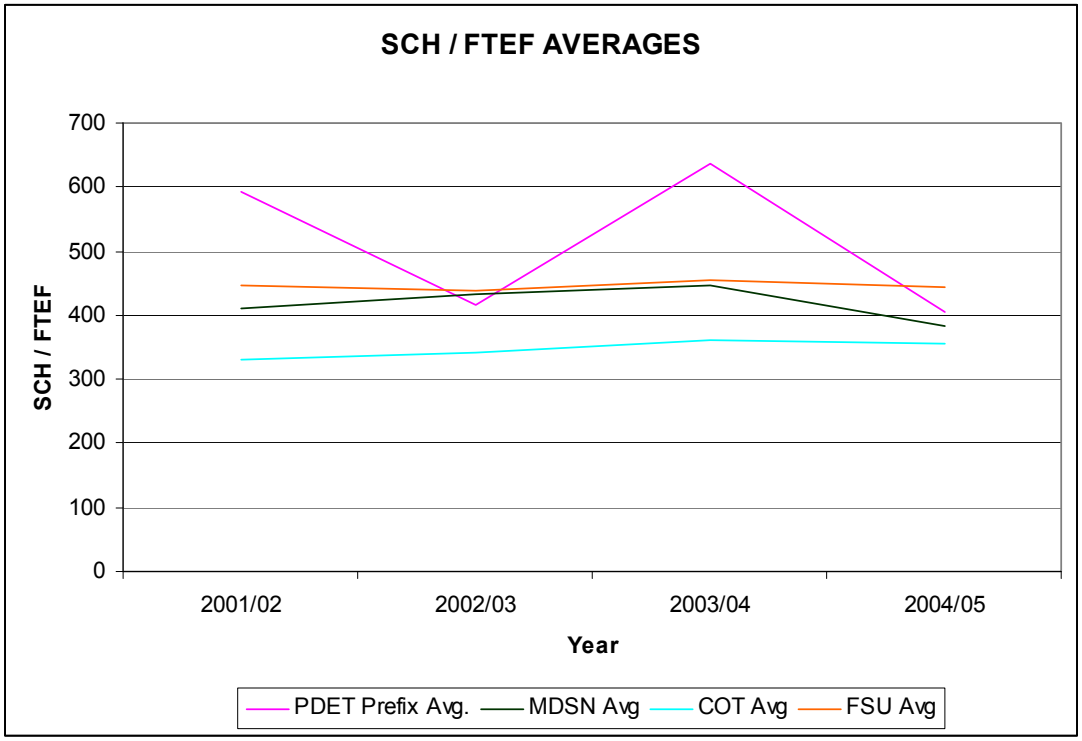
Course	Required By	Elective For	First Offered
PDET 312	PDET	AUTO, MECH	Fall 1993
PDET 412	PDET	AUTO, MECH	Fall 1993
PDET 413	PDET	AUTO, EEET	Fall 1993
PDET 322 (notebook PC based)	PDET	MECH etal	Winter 2001
PDET 415 (notebook PC based)	PDET	MECH etal	Fall 2002
PDET 322 (notebook PC Based)	MANF	none	Fall 2004
PDET 322 (computer lab. Based)	none	MECH etal	Winter 2006
PDET 190	MFGT	none	Fall 2006

It can be noted from this list that the course PDET 322 has had a record of expansion within the College of Technology. This course, which provides students with basic proficiency using a popular solid modeling CAD software package (Pro-Engineer), has experienced an expansion in demand because of the advantages this competency provides when seeking employment in many areas of mechanical design. Originally offered only to those students having notebook computers, it currently is also offered in a computer laboratory format as well. It is the intent of the PDET faculty to continue to seek out the opportunity to provide service classes in PDET specialty areas to any and all programs that can identify a need and that can provide a productive number of students.

It should be noted that the relatively new BS MET degree originally included PDET 422 and PDET 499 as part of its required core classes. As part of a curriculum change effective with the 2005/06 academic year these courses have been replaced with MECH prefix classes.

J. DEGREE PROGRAM COST AND PRODUCTIVITY DATA

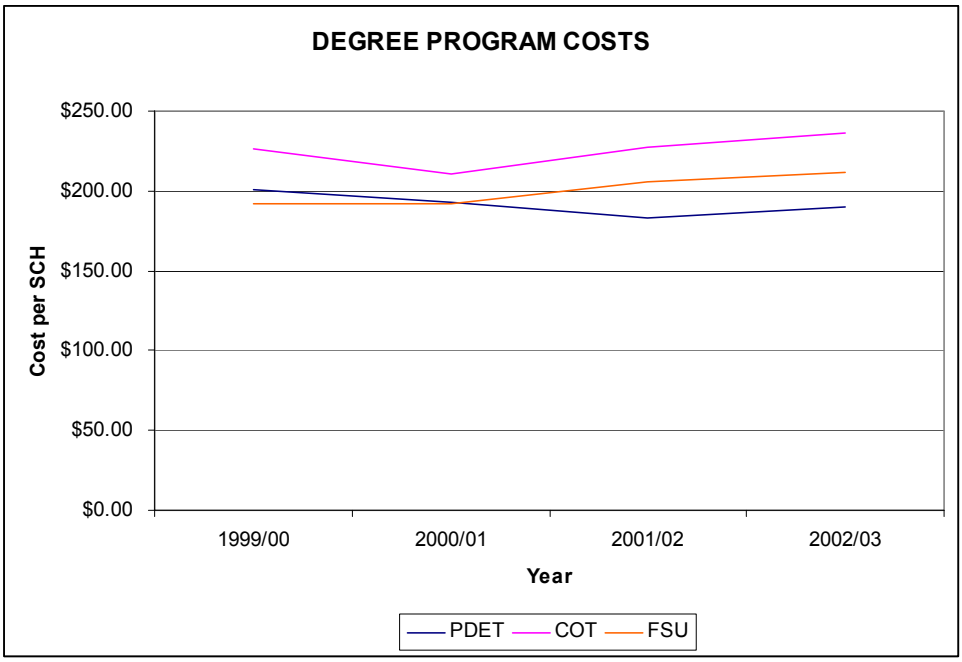
A summary of the productivity of all PDET prefix classes is shown in Figure 3.10. This information indicates that PDET prefix classes are generally above the average SCH/FTEF values for the Mechanical Design Dept. (MDSN), the College of Technology (COT) and Ferris State University (FSU).



	Average for;	2001/02	2002/03	2003/04	2004/05
PDET Prefix	**SCH / FTEF**	592.23	416.33	637.7	405.95
MDSN	**SCH / FTEF**	411.07	433.1	446.6	384.29
COT	**SCH / FTEF**	330.62	342.87	360.57	356.2
FSU	**SCH / FTEF**	446.69	439.43	454.22	444.01

Figure 3.10
Note; Data taken from FSU Productivity Reports

Figure 3.11 provides the Degree Program Cost for the most recently available four years. This measure indicating the average cost of a credit hour (SCH) shows the cost of a PDET SCH to be approximately flat. Historically (refer to 2000 PDET APR Report) the cost of a PDET credit hour is below the College of Technology(COT) average and at or slightly above the University (FSU) average. As indicated by Figure 3.11 however, beginning in the 2000/01 academic year, PDET Degree Program Costs are trending below both the FSU and COT average values.



	1999/00	2000/01	2001/02	2002/03	2004/05	2005/06
PDET	$200.48	$192.61	$183.48	$189.97	Not avail.	Not avail.
COT	$226.78	$210.93	$226.96	$235.92	Not avail.	Not avail.
FSU	$191.53	$191.59	$205.71	$211.68	Not avail.	Not avail.

Figure 3.11
Note; Data taken from FSU Degree Program Costing

An area of concern regarding PDET productivity is the replacement of PDET prefix courses with new MECH courses as required by the BS MECH program. The original BS MET program curriculum required several existing PDET courses. Two of these courses, PDET 422 and PDET 499, will be replaced with MECH prefix courses beginning in fall 2006. The effect of this change, unless accompanied by an influx of new PDET students, will be a loss of productivity for the PDET program. This underscores the need for increased PDET enrollment and an expectation that, until such an increase occurs, Product Design program productivity can be expected to deteriorate.

K. ASSESSMENT AND EVALUATION

The fundamental Product Design Engineering Technology program objectives are to graduate students with the mechanical design skills needed by employers to the extent that PDET graduates will successfully find employment and a professionally rewarding career. To accomplish this goal there are several measures that require continuing evaluation. The first measure, to determine if the program has appropriate admission standards, is demonstrated by the high degree of success in completing the program as indicated by graduate rate. Referring to Figures 3.5 and 3.6, it can be seen that the program has been successful in admitting students that are highly likely to graduate in a timely manner. The second measure requiring consideration is that the PDET program curriculum is providing a mechanical design education that has a valued place in the industrial economy. Success in this area is measured by the employment rates and starting salaries of program graduates. Referring to Figure 3.1 it can be seen that PDET program graduates are likely to find well-paying employment in industry. The final fundamental measure that must support the attainment of the other two objectives is that the education provided by the PDET program is adequately productive to be viable relative to other educational programs offered by Ferris State. Referring to Figures 3.9, 3.10 and 3.11 it can be seen that the PDET program and faculty productivity cost measurements

indicates that the program is more productive and has lower costs than is typical for both the College of Technology and FSU.

To achieve its fundamental objectives, the program, in conjunction with its faculty, students, alumni and industrial advisory board, have established a program curriculum that establishes various supporting objectives. The supporting, more specific, objectives of the PDET program as articulated in the most recent (fall 2005) Administrative Program Review (see Appendix C) are to provide each PDET graduate with;

a) An appropriate mastery of the knowledge, skills required to design and document mechanical products using both manual and computer based methodologies.
b) An ability to apply mathematics, science and mechanical engineering fundamentals to support mechanical design activities.
c) An advanced knowledge of three dimensional solid modeling of mechanical components and assemblies.
d) A familiarity with estimating project costs and schedule development.
e) A mastery of Geometric Dimensioning and Tolerancing (GD&T) standards and techniques.
f) The ability to apply relevant anthropometric data using fundamental statistical practice in the design of products.
g) The ability to develop product design requirements adequate to concept, design and manufacture mechanical products to meet a specific need.
h) An ability to communicate effectively.
i) A recognition of the need for, and an ability to engage in, lifelong learning.
j) An ability to understand professional, ethical and social responsibilities.
k) A respect for the diversity and a knowledge of contemporary professional, societal and global issues.

To measure that these supporting objectives are achieved the following assessment measures are used.

Evaluation Instrument	**Status**	**Frequency**
1. Course Survey Instruments (SAI)	In place now	Each semester selected courses
2. Projects and Presentations	In place now	Ongoing - included in at least one PDET course per semester
3. GD&T entering and exit assessment tests	In place now	Each GD&T course
4. Student surveys of laptop based CAD courses	In place now	Each laptop PC CAD course
5. Graduating student program assessment	In place now	Winter semester, 4th year
6. Course performance records	In place now	Ongoing in all PDET classes
7. Faculty program assessment	In place now	Regular meetings at program, dept. and college level
8. Alumni program assessment	In place now	Periodic - 5 year cycle
9. Employer assessment	In place now	Periodic - 5 year cycle
10. Industrial Advisory Board program assessment	In place now	Periodic - 2 year cycle
11. Academic program review	In place now	Periodic - 5 year cycle
12. Administrative program review	In place now	Annual
13. Post tenure faculty review	In place now	Periodic - 5 year cycle
14. General education outcomes assessment	In place now	Periodic by university committee

Assessments are conducted on an ongoing basis. Assessment results have been used to change course content, teaching methodologies and program policies such as required program equipment and course transfer policies. The results of some course outcomes, such as projects and presentations are used by the program's industrial advisory board as the basis of their review.

An area of concern with respect to assessment is the absence of an objective, quantitative evaluation instrument for PDET program specific outcomes. This instrument, which must be practical in terms of administration and evaluation, would ideally be part of some more widely normalized performance

standard. This instrument would be envisioned to be similar to the nationally normalized Fundamentals of Engineering test. Since this test has been developed for evaluating generalized engineering rather than engineering technology programs, some modification would be necessary to implement this instrument. In addition to a more effective and quantitative measure of PDET program outcomes, it is also possible that university as well as college assessment measures could be included in this testing. Examples of university outcomes that could be facilitated would be various general education metrics such as communication skills, quantitative skills, global consciousness, cultural enrichment and social awareness knowledge. College outcomes could include a higher level of mathematics competency, ethics knowledge and computer competency. Although integration of university and college level assessments into a single assessment would be likely prove difficult, the development of such an instrument for program level assessment is quite practical. The development of such an instrument has been suggested by PDET program faculty on a frequent basis since 1995, however support for the associated costs to develop such an instrument has not been provided.

L. ADMINISTRATION EFFECTIVENESS

A summary of general program expense (S&E) funding since the last program review has been unchanged during the five years since the 2000 APR for the Product Design program. In addition to this funding the PDET has also benefited from the incentive payments provided by offering the program off-campus in Grand Rapids. A history of funding from these two sources is as follows;

PRIMARY OPERATIONAL FUNDING FOR PRODUCT DESIGN ENGINEERING TECHNOLOGY

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Budgeted funding (S&E)	$5,402	$5,402	$5,402	$5,402	$5,402	$5,402
Incentive funding (FSU GR)	$2,181	$3,468	$4,697	$4,568	$2,112	$4,523
Total	**$7,583**	**$8,870**	**$10,099**	**$9,970**	**$7,514**	**$9,925**

While it is obvious that budgeted funding support has not matched increases in operating expenses (telephone, copying, etc) over the reported period, the PDET program has been able to cover its expenses largely through Grand Rapids incentive funding and has not exceeded its budget in any year. Without this external funding source, which has become a vital operational support and diminishing as a discretionary incentive, the PDET program would not be adequately funded. A clear threat to this funding has been the changes that have reduced the percentage of this incentive. This reduction implemented in 2004/05 have occurred in parallel with the development of FSU GR programming which have further reduced the enrollment base that is the source of this funding. Based on these changes, continued significant reductions in incentive funding are probable in the near future requiring a greater contribution from budgeted funding to cover program expenses.

While an overall stagnation in funding threatens the future of the program, the most problematic administrative based threat to the program is the department chair structure currently in place within the College of Technology. With a faculty base of two members, a significant loss in program manpower results whenever the department chair is a PDET program faculty member. At other times, when the department chair is from another program in the department, PDET program faculty are required to support overload teaching to cover the reduced capacity of other programs. While the PDET program is not adequately large to exist as a department, a much more acceptable arrangement would be to provide apportioned faculty release time at program level to support administrative program requirements.

SECTION 4

FACILITIES AND EQUIPMENT

A. INSTRUCTIONAL ENVIRONMENT

Currently, most Product Design courses (PDET prefix) having lecture content are taught in Swan 301A. This room received new powered modular tables, chairs and a wireless network access point as the result of recommendations from the PDET program's Academic Program Review of 2000. Furniture removed from SWN 301 was used to upgrade the general purpose MDSN department classroom in SWN 302. Since these improvements in summer 2003, SWN 301 has presented a stable, professional image to students and has an appealing historic display of all prior Product Design graduating classes. The room has been a positive motivator for Product Design students and those considering entering the program. The room is currently the classroom of preference on the third floor of SWN and is well utilized by programs other than Product Design. Most recently room 301A will receive new lighting, the repair of its damaged ceiling and the installation of an overhead mounted projector as part of a minor capital improvement project during the summer of 2006.

In addition to its primary classroom (301A), the PDET program has exclusive use of a secure, small storage area immediately adjacent to the classroom. This space contains a single PC work station with printing, scanning and image processing capability for use primarily by senior students for their design projects. This is a stand alone station dedicated to PDET students and it is not part of the campus network. The area also provides secure storage for PDET files, reference material and for student project work in progress.

The primary deficiency with the existing 301A environment is environmental. During early fall semester and late winter semester, the third floor of the Swan Building becomes nearly intolerable as a teaching/learning environment with temperatures frequently exceeding 90+°F accompanied by high humidity. The presence of student computer equipment accentuates this heating problem. It is important to consider adding at least a localized air conditioning capability to the 301A classroom.

A secondary PDET program facility deficiency is the lack of available studio space for PDET students to use when fabricating the prototypes required for program classes. Individual student studio space for PDET 4th year students would be a major positive factor in attracting new students and improving the learning experience of existing students. This space would not be required to be located within the Swan building and space adequate to provide each 4th year student with an individual 4' x 4' area appears to be available at several locations on campus.

B. COMPUTER ACCESS AND AVAILABILITY

Prior to Winter 2001, the Product Design program was frequently limited by a lack of available computer laboratory space. After implementing mandatory student notebook computer use at that time, this problem was effectively eliminated. Any PDET class using the modular power distribution in SWN 301A can become a computer laboratory session with little advance planning and without compromising the lecture capability of the classroom. All PDET classes with computer content are taught in SWN 301A and student response has been uniformly positive (see Section 3 G). Secondary benefits of the student notebook computer requirement, in addition to classroom flexibility, include improved 24/7 access to required program software, continuing class access to current PC technology (each new PDET class brings their own, new, computing environment) and reduced program costs. All software and operational problems are resolved by the PDET student with assistance from a PDET faculty member. No computer consortium resources, software planning and/or periodic replacement costs have been required by the Product Design program to support classroom instruction since 2001. Three dimensional, solid modeling software critical to the mechanical design process is provided through a site license negotiated by the PDET faculty and paid as an annual expense from the PDET program budget (currently a $2500 expense annually).

It is recommended that the College of Technology consider the implementation of student provided notebook computers as a means to increase the flexibility and reduce the costs of its current computer laboratory facilities. Significant amounts of data over the last five years have been collected and tabulated by the PDET faculty documenting the advantages of the concept.

C. OTHER INSTRUCTIONAL TECHNOLOGY

Aside from the problem areas identified in sections A and D (the need for classroom climate control, studio design space and improved access to industry standards), the Product Design program has no other concerns with its facilities and equipment.

D. LIBRARY RESOURCES

The Product Design program extensively uses FLITE Library resources for several courses within the curriculum. Due to the nature of the design profession, much of the most important information is constantly changing in source and in content. This means that the primary Product Design student use of the library typically involves the periodical collections. The Product Design program faculty have been involved on an ongoing basis in selecting which periodicals are needed by the library to support the program. In addition to this service, the Product Design program also uses the library to place critical student reference material on reserve.

By far the most important library contribution to the program is the support of the student patent searches required as part of the Senior Design Project. Although most critical patent information has now been made directly available to students from the U.S. Patent Office via internet, the library continues to provide invaluable support in training Product Design students how to search the patent information database.

An area of continuing interest and difficulty for Product Design program students is the availability of industrial standards for design reference. Industrial standards are typically privately published, very expensive and lack ready availability. PDET program faculty have made the FLITE staff aware of this difficulty and various solutions are being considered.

SECTION 5

CONCLUSIONS AND RECOMMENDATIONS

Relationship to the FSU Mission

The mission of Ferris State University is to be a national leader in providing opportunities for innovative teaching and learning in career oriented, technological and professional education. Consistent with the mission of the University, the Product Design Engineering Technology program provides a comprehensive education in mechanical design equal to the demands of today's industrial environment while preparing the graduate for the technical challenges of tomorrow's workplace.

Program Visibility and Distinctiveness

The PDET program is unique on several levels. It is one of the few remaining programs offered by the College of Technology at the Applied Technology Center in Grand Rapids. It is exceptionally transfer friendly in that it provides equal opportunity for prospective students to complete admission requirements at any community college as easily as those students who enter the program from an on-campus two year degree program. Approximately half (46%) of new Product Design program students are transferring from another institution. In many cases, the PDET program provides the only feasible path to a technically relevant BS degree for graduates of two year, Associates of Applied Science (AAS) programs.

The program curriculum is unique in that it includes technical content necessary for the engineering analysis required for mechanical design and couples this knowledge with other content necessary to develop products rather than components. It is this blending of engineering science and areas such as intellectual property legal aspects, ergonomics and formal technical communications that has no direct parallel to any other program in Michigan or (with few exceptions) nationally.

The central problem area for the PDET program is its lack of visibility. Other than the students already enrolled in College of Technology programs, most potential students only discover the existence of the program by personal referral or by chance. Even when aware of the program, adequate information to make an application decision and to establish contact with program faculty is difficult.

Program Value

The Product Design Engineering Technology program is of exceptional value to the university. It requires a minimum number of faculty and institutional resources, having the smallest number of faculty (2) and the lowest annual operating budget in the College of Technology. Costs per student credit hour are at or below university and college levels and faculty productivity is high. The level of innovation as indicated by the program's notebook computer initiative is remarkable. The innovative elimination of computer laboratory requirements has effectively removed the computer laboratory and associated support requirements of the program for the last six years while providing a high level of student satisfaction. Program graduation rates are exceptional in that 86.9% of students entering the program graduate and do so in a timely manner. A very large number of graduates (96.6%) complete within 3 years and 75% complete the program in the prescribed two years. The program curriculum is also of benefit to the university and the college in that only 38% of required courses are restricted to the program, the remainder provide supporting enrollment for the College of Technology and the university.

Enrollment

Program enrollment is an area of concern. The negative impact of the new BS Mechanical Engineering Technology degree on the on-campus program and that of the Industrial Technology Management BAS degree in Grand Rapids have eroded significant sources of new program enrollment. Unless effective action to reach new potential students is immediately initiated, falling enrollment could threaten the future viability of the program.

Characteristics, Quality and Employability of Students

Product Design program students enjoy a high level of success in job placement with few graduates reporting significant difficulty in obtaining employment within some aspect of design (see Section 2A of this report). The degree also has proven value among potential employers with graduates reporting the 6th highest average starting salary of all university degree programs in the most recent report (see Section 3 of this report). In addition graduates report a meaningful rate of advancement as measured by the salary growth statistics developed from alumni salary histories.

The quality of program students and the effectiveness of program admission standards are indicated by the very high graduation rates in the program. Students graduate at nearly an 87% rate and usually do so in the prescribed two years, indicating a superior performance record relative to typical university students.

Quality of Curriculum and Instruction

The program curriculum evidences innovation and a desire to adapt to technological changes in the industrial workplace. The successful implementation of solid modeling software into the program and the conversion to instruction using student owned notebook computers (implemented since the last program review) are evidence of the dynamic nature of the Product Design program curriculum. The program also features a diversity in content necessary to maximize the employment opportunities for program graduates in a variety of mechanical design career paths. The distribution of program course requirements (almost equally divided between the program, the college and the university) also supplies supporting enrollment for other university degree programs.

Survey reports from current students, program graduates, the program advisory board and the potential employers of PDET graduates all indicate that most courses within the program curriculum are appropriate, meaningful and well delivered.

Composition and Quality of the Faculty

The Product Design program faculty is small, consisting of two faculty members. The faculty exhibits an appropriate level of industrial experience and technically appropriate academic backgrounds necessary to produce successful graduates. The program faculty actively seeks out opportunities to develop new courses both for PDET as well as other College of Technology programs. In addition, the program faculty exhibits the versatility to teach a number of courses for other programs and departments. Both PDET program faculty members have an excellent record of promotions and professional development.

Recommendations

Minimal but important changes could significantly improve the PDET program and address the recent decline in program enrollment.

1. Provide additional support for program promotion. Enrollment growth from transfers within existing university degree programs is limited and typically achievable only at the expense of other university programs. In addition, the number of available internal transfer students can be expected to decline as Ferris State de-emphasizes the 2+2 programs and concentrates on 0-4 degree programs. As experienced

with the recently created BSMET degree program, successful students are unlikely to transfer to an alternative degree path. The real opportunity for enrollment growth therefore lies in attracting transfer students who have completed two years of study at a community college or a different university. The results of this program review indicate that there is a significant level of potential interest in the program among various Associates of Applied Science (AAS) students at Michigan Community Colleges that are aware of its existence. The most significant obstacles in successfully attracting these transfer students seems to be a low level of awareness of the program and its entrance requirements. In addition to beginning or expanding the promotion of the program through normal advertising channels, an effort to develop direct contact between program faculty and advisors and counselors at target transfer institutions should be initiated. To facilitate this effort the university must provide appropriate recruiting tools (posters, fliers, etc.) and support the effort with release time and travel funding.

2. The current administrative structure of the College of Technology has a negative effect on the Product Design program. In order to be successful, every academic program needs to have adequate opportunity to participate in administrative and recruiting activities. Although currently the Product Design program could not productively support a full time administrative position, the history of the program and its potential for growth does justify limited release time for program support activities. The current College of Technology structure with the program jointly sharing administrative support with two other degree programs is ineffective. The 75% release time allocated to a chairman position filled from a single program cannot be effectively shared by three different academic programs (PDET, CDTD and MECH) and two programs are always inadequately supported. A more equitable system for distributing the chairman's release time based on program enrollment or some other metric would provide continuous support for all department programs including Product Design.

3. Facility improvements would significantly improve the program's image. The lack of climate control in the program's primary classrooms is at variance with the modern and successful image that Ferris State seeks to project in all its learning spaces. Serious consideration should be given to providing air conditioning and improved air exchange in all Swan Building classrooms including the PDET classroom.

4. The Product Design program would be significantly improved by providing each senior PDET student with an individually assigned studio space for prototype development. Recent campus expansion activities have created suitable available space (Ford dealership building, Prakken and Alumni buildings, etc). The use of approximately 1000 square feet of currently available space for 20 senior students would greatly assist program students in completing their capstone project activities.

APPENDIX A

Supporting information for Section 1 – Program Overview

Bureau of Labor Statistics, US Dept. of Labor, *Occupational Outlook Handbook, 2006-07*.
Mechanical Engineering
(A-2)

Bureau of Labor Statistics, US Dept. of Labor, *Occupational Outlook Handbook, 2006-07*.
Commercial and Industrial Designers
(A-3)

MECHANICAL ENGINEERING[1]

Mechanical engineers research, develop, design, manufacture, and test tools, engines, machines, and other mechanical devices. They work on power-producing machines such as electric generators, internal combustion engines, and steam and gas turbines, as well as power-using machines such as refrigeration and air-conditioning equipment, machine tools, material handling systems, elevators and escalators, industrial production equipment, and robots used in manufacturing. Mechanical engineers also design tools that other engineers need for their work. Mechanical engineering is one of the broadest engineering disciplines. Mechanical engineers may work in production operations in manufacturing or agriculture, maintenance, or technical sales; many are administrators or managers.

Mechanical engineers are projected to have an **average rate of employment growth** through 2014. Although total employment in manufacturing industries—in which employment of mechanical engineers is concentrated—is expected to decline, employment of mechanical engineers in manufacturing should increase as the demand for improved machinery and machine tools grows and as industrial machinery and processes become increasingly complex. Also, emerging technologies in biotechnology, materials science, and nanotechnology will create new job opportunities for mechanical engineers. Additional opportunities for mechanical engineers will arise because the skills acquired through earning a degree in mechanical engineering often can be applied in other engineering specialties.

Earnings for engineers vary significantly by specialty, industry, and education. Even so, as a group, engineers earn some of the highest average starting salaries among those holding bachelor's degrees. The following tabulation shows average starting salary offers for engineers, according to a 2005 survey by the National Association of Colleges and Employers.

Curriculum	Bachelor's	Master's	Ph.D.
Aerospace/aeronautical/astronautical	$50,993	$62,930	$72,529
Agricultural	46,172	53,022	
Bioengineering & biomedical	48,503	59,667	
Chemical	53,813	57,260	79,591
Civil	43,679	48,050	59,625
Computer	52,464	60,354	69,625
Electrical/electronics &	51,888	64,416	80,206
Environmental/environmental health	47,384		
Industrial/manufacturing	49,567	56,561	85,000
Materials	50,982		
Mechanical	50,236	59,880	68,299
Mining & mineral	48,643		
Nuclear	51,182	58,814	
Petroleum	61,516	58,000	

[1] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2006-07 Edition*, Mechanical Engineer, on the Internet at **http://www.bls.gov/oco/ocos027.htm** (visited *June 21, 2006*).

INDUSTRIAL DESIGN[2]

Commercial and industrial designers combine the fields of art, business, and engineering to design the products used every day by businesses and consumers. These designers are responsible for the style, function, quality, and safety of most manufactured goods. Usually these designers will specialize in one particular product category. Some specialties include automobiles and other transportation vehicles, appliances, technology goods, medical equipment, furniture, toys, tools and construction equipment, and housewares.

Employment of commercial and industrial designers is expected to **grow about as fast as average** for all occupations through 2014. Employment growth will arise from an expanding economy and from an increase in consumer and business demand for new or upgraded products. However, competition for jobs will be keen because many talented individuals are attracted to the design field. The best job opportunities will be in specialized design firms which are used by manufacturers to design products or parts of products. Designers with strong backgrounds in engineering and computer-aided design, as well as extensive business expertise, may have the best prospects.

Median annual earnings for commercial and industrial designers were $52,310 in May 2004. The middle 50 percent earned between $39,130 and $68,980. The lowest 10 percent earned less than $29,080, and the highest 10 percent earned more than $86,250.

[2] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2006-07 Edition*, Commercial and Industrial Designers, on the Internet at **http://www.bls.gov/oco/ocos290.htm** (visited *June 21, 2006*).

APPENDIX B

Supporting information for Section 2 – Collection of Perceptions

June 5, 2006

Xxxx
Xxx
Xxx
Xxx

Dear xxx,

I hope that this letter finds you, your family and your professional career doing well at this point after your graduation from the Product Design program at Ferris State University. I am sure that your work and other responsibilities greatly limit your available time. I am writing you, however, to request your help in an important activity that will directly impact the future of the program and its graduates.

All degree programs at Ferris State University are required to be reviewed periodically in accordance with the requirements defined by our academic accrediting agency. An important part of this review is a continuing evaluation of the program by its graduates. In order to provide an organized means for collecting the perceptions of program graduates, a 25 question survey has been prepared and accompanies this letter. The survey is intended to evaluate relevant aspects of the Product Design Engineering Technology (PDET) program. It also requests information about yourself and your professional experiences as a program graduate as well as your opinions about various aspects of the current program.

The results of this survey will be used to create an overall evaluation of the program and any information you provide will be used only for that purpose. All responses will be reported collectively without identifying you personally in any way. Your completed form will be kept within the PDET program. Should you not feel comfortable in answering any question, however, please feel free to simply leave it blank and complete only those questions that you are comfortable with. Any and all information that you are willing to provide will be valuable.

Your responses will be used to complete an accurate and current description of the PDET program as viewed by its alumni. In addition your collective responses that indicate a need for change will be used to modify and improve the PDET program to meet the ever changing needs of the work place.

To complete the analysis of your collective input, I would like to have your responses returned to me no later June 30, 2006. If you have questions or need more information to complete the survey, please feel free to call me at (231) 591-2635 or e-mail me at goosenr@ferris.edu.

Thank you,

Richard F. Goosen, PE
Professor
Product Design Engineering Technology

FERRIS STATE UNIVERSITY
Product Design Engineering Technology
Alumni Survey

The Mechanical Design Department of Ferris State University is conducting a survey of alumni to be used in the continuing development and improvement of the Product Design Engineering Technology (PDET) program. Please return your survey to Ferris State University, Mechanical Design Department, 915 Campus Dr., Swan 405, Big Rapids, MI, 49307-2291. Thank you for taking the time to complete the survey. Your answers will be of great help in determining the future direction of the program.

About Yourself

Please note that this information will be collected and used by the Product Design Program without identifying you personally. Your identity will be considered confidential and not released outside of the Product Design Program. Feel free to not answer any question that you are not comfortable answering.

Q1 **Name: (Please note that you can ignore questions 1-4 if you attach a current business card)**

Q2 **Company you currently work for:**

Q3 **Title:**

Q4 **City and state where you work:**

Q5 **What year did you graduate from the Design program?**

Q6 **What was your Associate's degree area of study?**

Q7 **Where did you earn your Associate's degree?**

Q8 **Did you take *most* of your PDET courses on-campus or off-campus? (*Please select only one response*)**

- ☐ On campus
- ☐ Off campus

Q9 **Have you completed any college coursework since leaving FSU?**

- ☐ Yes
- ☐ No

Q10 **If you answered "Yes" to Q9, what was your area of study/program and which college or university did you attend?**

Q11 **What was your starting, approximate, annual salary in dollars after your graduation? (*Optional - please select only one response)***

- ☐ 15-20,999
- ☐ 21-25,999
- ☐ 26-30,999
- ☐ 31-35,999
- ☐ 36-40,999
- ☐ 41-45,999
- ☐ 46-50,999
- ☐ 51-55,999
- ☐ 56-60,999
- ☐ 61-65,999
- ☐ 66-70,999
- ☐ 71-80,999
- ☐ 81-90,999
- ☐ 100,000 or more

Q12 **What is your current, approximate, annual salary in dollars? (*Optional - please select only one response)***

- ☐ 15-20,999
- ☐ 21-25,999
- ☐ 26-30,999
- ☐ 31-35,999
- ☐ 36-40,999
- ☐ 41-45,999
- ☐ 46-50,999
- ☐ 51-55,999
- ☐ 56-60,999
- ☐ 61-65,999
- ☐ 66-70,999
- ☐ 71-80,999
- ☐ 81-90,999
- ☐ 100,000 or more

Q13 **Which of the following best describes your current position? *(Please select all that apply)***

- ☐ Design
- ☐ Sales/Marketing
- ☐ Project/Product Management
- ☐ Technical Management (of an engineering dept. or section)
- ☐ General Management (of a facility, company, division, etc.)
- ☐ Other

Please Specify:

About Your Product Design Education

Q14 **In your opinion, based on your experiences since graduation, to what extent did the specific content areas of the Product Design academic program prepare you for employment. Please indicate your opinion for each subject using the scale provided.**

	Very Unimportant	Somewhat Unimportant	Neutral/Did Not Take Subject	Somewhat Important	Very Important
Advanced GD&T	☐	☐	☐	☐	☐
Statics & Strengths of Materials	☐	☐	☐	☐	☐
Electronics	☐	☐	☐	☐	☐
Art	☐	☐	☐	☐	☐
Dynamics	☐	☐	☐	☐	☐
Ergonomics	☐	☐	☐	☐	☐
Plastics Material Selection	☐	☐	☐	☐	☐
Applied Calculus	☐	☐	☐	☐	☐
Machine Design	☐	☐	☐	☐	☐
Psychology	☐	☐	☐	☐	☐
Thermodynamics	☐	☐	☐	☐	☐
Metals Materials Selection	☐	☐	☐	☐	☐
Advanced Composition	☐	☐	☐	☐	☐
Technical Presentations	☐	☐	☐	☐	☐
Finite Element Analysis (FEA)	☐	☐	☐	☐	☐
CAD Solid Modeling	☐	☐	☐	☐	☐
Senior Design Project	☐	☐	☐	☐	☐

Your Opinions on Miscellaneous Topics

Q15 **In your opinion, what was the most valuable aspect of the PDET program? This may be a course (or courses) or a general aspect of the program (i.e., "applied problem solving").**

Q16 **In your opinion, what was the least valuable aspect of the PDET program?**

Q17 **To what degree do you agree with the statement "I had an easy time finding my first job after graduation"?**

- ☐ Strongly Disagree
- ☐ Somewhat Disagree
- ☐ Somewhat Agree
- ☐ Strongly Agree

Q18 **Overall, how satisfied are you with the PDET education you received at FSU?**

- ☐ Very Dissatisfied
- ☐ Somewhat Dissatisfied
- ☐ Somewhat Satisfied
- ☐ Very Satisfied

Many engineering technology programs are now adding additional mathematics content and becoming engineering (not engineering technology) programs. This usually requires a change to more theoretical rather than application centered courses in the engineering program.

Q19 **In your opinion, should the PDET program become an engineering rather than an engineering technology program?**

- ☐ Yes
- ☐ No

Q20 **In your professional experience, has being a graduate of an engineering technology rather than an engineering program been a limitation in your career?**

- ☐ Yes
- ☐ No

Many engineering technology programs are accredited by a national engineering organization (ABET). The current PDET program is not ABET accredited. To become accredited under ABET rules, the program would incur significant expense and would probably be required to add new courses and/or eliminate some existing technical courses.

Q21 **In your professional experience, has being a graduate of a non-ABET accredited engineering technology program been a limitation in your career?**

- ☐ Yes
- ☐ No

Q22 **In your opinion, should the PDET program make the necessary changes to become ABET accredited?**

- ☐ Yes
- ☐ No

Q23 **Based on your experience, would you recommend PDET students join a professional organization before graduation? (Note: Currently many PDET students become SAE members.)**

- ☐ Yes
- ☐ No

Q24 **If you answered "Yes" to Q20, which organization would you recommend?**

Q25 **In your opinion, how important to a product designer is the ability to create renderings and sketches of products by free hand drawing?**

- ☐ Not Important
- ☐ Useful, but not important
- ☐ Very Important

Q26 **Please utilize this space to provide any additional program changes you would recommend or general comments you wish to make.**

Thank you for your help in evaluating the Product Design Program.

SECTION 2 A

ALUMNI SURVEY RESPONSES[1]

Question 10 Reponses;

1. FSU recreation leisure services outdoor education
2. Attained MBA from GVSU
3. Grand Valley Masters (Manufacturing Emphasis)
4. Designing Engineer Certification Michigan Tech
5. MBA (pre-req's) at SVSU, however will attend CMU for MBA Curriculum
6. CMU- Industrial MGMT MA. FSU – Career and Tech –ED. MS
7. MSE, MFG Operations at GVSU
8. MS in Engineering Management from Western Michigan University
9. General- Humanities at Delta College, University Center, MI
10. ENG MGMT / WMU
11. Engineering MGT. Kennedy – Western
12. No program just classes to keep up with technology, etc.
13. Engineering Management / Industrial Technology, MS Eastern Michigan University 2004
14. MBA - Michigan State
15. Wayne State University, Industrial Engineering Tech. Masters Courses (no degree).
16. Mechanical Engineering, GVSU
17. Educational Credits from Plumbing Local
18. Graphic Design
19. Hydraulics, Mid Michigan Community College
20. A.C.C., job related courses
21. Operations Management, Kettering University, Masters of Science
22. I did take a course in pro/engineering through my employers, but it was not a college course.
23. AutoCAD, Montcalm Community College
24. Engineering/FEA, graduate level, GVSU
25. Engineer Management, Univ. of Missouri-Rolla (UMR), grad. degree program
26. MBA Technology Management, University of Phoenix, UOP
27. Mechanical Eng., Michigan Tech
28. MSCTE at Ferris (currently enrolled)
29. Air Force Community College
30. Received a Manufacturing Operations Management Certificate afterwards at FSU.
31. Some calculus and physics to get in a maters program.

Question 15 Reponses;

1. Any kind of physics or material selection
2. The project final and the calculus class and lower math also the composition and the art classes helped me right now
3. The most valuable aspect of the program was the more "hands on" approach to product design
4. The overall layout of this program was very good. I wish we could have spent more time in the Machine Design book, as the company that I work for deals more within the Mechanical Drive systems and the heavy equipment products. I feel these two classes were rushed through due to the fact that most of the companies now don't have to deal with to many large gear drive systems.
5. Senior Design Project, as it applies understanding of the full scope of design, project management, presentation and communication. Also, statics and strengths are valuable and should be reinforced whenever possible
6. Application of coursework led to an immediate ability to add value to my employer

[1] All responses are provided as submitted except for the removal of names and personal references.

7. Senior project
8. More real life experiences internships or actual positions
9. The strength of any college program to me is real-life applications of the course material. I've talked to many ME grads who say "It wasn't like this in school". That's because when you deal with things theoretically they always work out nice and neat, and in real-life they often don't.
10. To hear the voice of the customer and be able to respond by designing and innovative product to the customer needs
11. Senior Design Project- learned discipline in time management, prioritization and importance of clear written communication skills.
12. Looking back on the courses I took I feel that most of it was very weak, but I was in the first graduating class. I am sure things have gotten much better. The best part was getting a degree with BS
13. Machine Design- I recommend more classes of this type
14. Problem solving skills, communication skills learned throughout the program
15. Computer modeling / diversity of knowledge base
16. For my career machine design, CAD, materials, have been of most value. If there were no problems, there would be no jobs, problem solving being valuable is a given
17. Good, real world skills
18. The most valuable aspects of the PDET program in the real life situations discussed in the classes. Also, being applications centered has proven to be beneficial since it allows you to walk on to a new job and start to pay dividends for the company you are working for
19. Strengths of materials
20. The broad based curriculum and labs
21. Senior project – one on one counseling with faculty
22. Very broad based education
23. Senior design project was the most valuable because it required problem solving, talking to customers and suppliers. It also made you focus on cost and how you can improve the design, but make it cost effective
24. The wide range of applied course makes or develops a student into a well-rounded individual. Upon, graduating I believe of hoped to have become a Designer, hence, I never figured courses such as speech, composition, and psychology would be of any use to me. However, since my career path has taken me on business side of things, I now believe those were probably the most important course! I work with Engineering Sales and Manufacturing on a daily basis, hence, I am very happy to have had the range of course I did
25. Strength of materials, vibrations, dynamics, electronics
26. Applied problem solving, working in teams on projects
27. Exposure to "advanced" subjects like dynamics, thermodynamics, FEA etc. to allow me to have a basic understanding while CAD and problem solving has become my strong point.
28. Any lab that applied to real world experience.
29. The real life examples were most helpful in remembering the material. I still can't ride on an airplane without thinking about the safety factor they are built with.
30. Broad overview of many topics and the hands on experience. Also the applied nature of the courses gave me a nice head start on my first job.
31. Learning a little bit about several subjects. It helped me know what I didn't know.
32. Senior design project
33. FEA, dynamics, GD&T, statistics, math/science
34. I feel the courses marked "very important" and "somewhat important" in Q14 above, really shaped and defined the backbone to the curriculum. Based on my career path, from tooling design to Dim. Perf. Eng., those 8 classes helped me the most.
35. Classes being more "real world" vs. theoretical.
36. Senior project
37. The program overview of general design and engineering.
38. Plastics courses
39. The most valuable part of the program was connecting topics through the different courses, along with the team-like atmosphere.
40. Metal mat., strength of mat., thermo, tech prest., sr. project

41. Working thru real-world examples and problems. It gives an open-ended problem/solution and forces creativity.
42. The wide variety of courses provided valuable problem solving skills.
43. Machine design, writing and speech = technical presentations
44. Team problem solving
45. Applied engineering
46. Technical presentation and advanced comp are very important. Must have more on CAD-3D-solid modeling! Must have more on polymers. Injection molding/vac forming/extrusion tooling
47. Senior design project teaches you to be self-reliant, and solve your own problems.
48. Geometric construction – I know and can figure out how to cut and bend steel in a lot of odd shapes, that other people at work don't know how to figure it out.
49. Senior design project
50. Senior design project: good preparation for process of design and release.
51. Metals materials selection – used on a daily basis. Deal w/special alloys. Program utilized hands on learning!
52. Senor design project. Puts all the engineering together. Great summary and refresher before entering the work force.
53. Understanding the properties of materials, design strengths and failures, machining concepts, hydraulics, pneumatics and electrical students.
54. Pro/E and mechanical
55. Size of class
56. The PDET's most valuable aspect is its "real life" engineering approach. This method of applied engineering has given me the tools to be an asset to my company right out of college. Since graduation, there has not been one engineering problem I couldn't solve. I did notice the difference between graduates with M.E. degrees. They usually required some form of mentoring for a couple of years. This made me realize how lucky I was to graduate from FSU with a PDET degree.
57. Ability to take off campus courses after work
58. The variety of courses got me used to variety in the workplace. I'm noticing that people who are specialized, or can't adapt to other roles do not seem to last too long – unfortunately.
59. MECH 340, PDET 321, PDET 411, 422, PLTS 342 These classes gave me a very solid understanding of engineering basics in many aspects.
60. Having a BS degree
61. In spite of many classes that I found personally enlightening, prospective employers were completely unimpressed and were only looking for work experience or an accredited engineering degree.
62. The mechanical background and applied problem solving – every day as part of my job I help root cause why something did not meet a design requirement.
63. Just having a 4 yr. degree
64. Real world application required for the Senior Design Project
65. It helped me develop problem solving skills without thinking on the theory of problems.
66. The labs give very valuable experience to the course of study.
67. Quality of engineer instructors (Mr. xxxx, & PDET staff). Mr. xxxx's ability to bring "professional" humor with challenging classes . . . "It's all relative . . ." stories, etc.
68. Plastics and material selection
69. Technical – not theory
70. The 7 "very important" subjects (above)
71. Problem solving and the solid modeling
72. Statics & strengths of materials and metals materials selection
73. Design project
74. Hands on learning
75. The professors were the most valuable aspect of the PDET program.
76. Machine design courses, prototype course, getting a degree
77. Gets you ready for the work place with the ability to solve problem and also think outside the box and brainstorm about different solutions to the problem we are faced with.

78. The ratio of instructor to students for questions and follow up. The courses were a good cross-section of what is generally required in the industry. Though composition and speech were not my personal favorites they are the most valuable tools in today's line of work. More time is spent in research, writing, and presentation materials than what was expected. Microsoft applications (PPT. XLS. DOC. PJT)
79. Advanced GD&T
80. The overall experience that the university offers.
81. All "hands-on" experiences. Real-life examples given by experienced professionals.
82. The broad base nature of the program, which allows a person to move into many potential opportunities.

Question 16 Reponses;

1. Advanced composition
2. The least valuable aspect . . . can't think of any.
3. For the company that I work for art would be the least valuable. But other companies it could be very valuable.
4. The overlap with the MET program, lack of solid modeling when I attended, also I see a greater need for more plastics background.
5. Psychology
6. Electives, Art
7. Statistics. It should be much more important, as stats and what management looks at (efficiencies, CPk, etc.) and should focus on those aspects more. When I took it, it was poorly taught and didn't seem very useful.
8. HSET – controls class
9. Clay modeling and I remember a class about rendering/drawing
10. Psychology – this was a class of no value
11. Psychology courses
12. Can't think of anything.
13. No ABET
14. Everything I was exposed to in the PDET program has had a hand in everything I do at work, from ergonomics to technical writing. I think everything is valuable.
15. Not sure
16. The model and prototype class.
17. Electronics, but I have never worked in that area.
18. Psychology (second course required) one psychology class is enough to give a person the knowledge they may need on the job.
19. Electronics
20. All the courses had a valuable aspect to the program.
21. Sr. design project was an individual project which imposed many limitations in scope. In industry there are few times when you work alone. A larger more involved team project would be a better learning experience.
22. Taking a humanities class.
23. Psychology
24. Industrial psychology
25. Psychology
26. Psychology
27. In the 5 years that I attended Ferris, no one discussed what a bill-of-materials was, or now to properly manage them!!!
28. Art/entering job market in bad economy.
29. Elective courses should be a little more flexible.
30. Electronics
31. Calculus
32. Not sure . . .
33. Psychology
34. I/O psychology

35. Coursework on material strength and the program was too broad and did not allow for development of specific marketable skills (i.e. mechanical engineering skills).
36. Design for Mfg. class was poorly taught. In my case, may be most important (toward top of list) subject matter to learn for design engineers.
37. Senior project
38. Psychology – foreign relations would be a better global industry today.
39. The psychology teacher was a genuine ####. This course is important and should be adapted for mechanically thinking people in lieu of "artsy" emotional thinkers.
40. Chemistry
41. Lack of computers
42. I feel that all courses were important.
43. The program should have a course and help seniors get their EIT.
44. Fluids and Thermodynamics and FEA
45. PDET 322, 415 (Solid Modeling) Pro-E seems to be a very obsolete once in industry, UNIGRAPHICS, CATIA, AutoCAD, data translation would be a helpful topic /,UGS ,STO ,XT etc , , , How CAD data is used/applied in industry (very prof. dependant)
46. Since I already had a job as a designer, I think I knew how to design and manage a project, so the senior design project was not worth the time or effort. A better class was Robert Speirs PLT 338 where he taught to normalize resins, consider production method, quantity, tooling and failure modes in weekly assignments.
47. Placement services, both for internship and post-graduation are abysmal.
48. Art, although, it was a fun class to take.
49. The lack of Ansys/Pro-E/AutoCAD
50. I am unable to identify a "least valuable" aspect.
51. The art class could be replaced with a materials or advanced FEA class.
52. Mostly the humanities did very little to help with my career.
53. Elective courses/instructors "Marriage and the Family"
54. Not recognized as a BSME or equivalent.
55. Core classes – I took Native American Literature. I ended up not using Electronics at all.
56. Plastics Material Selection. If you are interested in this then that should be your major.
57. Psychology
58. Art
59. Art
60. Depending on which industry you decide to go into, all parts of the PDET program are valuable.
61. Testing
62. The amount of night classes that were given in the senior year. I believe all the night classes at that time hurt the student's ability to focus on Senior Project.
63. All courses were relevant, even the electives. A person in the early years needs external major exposure to keep an open mind and expand their boundaries.
64. Electronics
65. All valuable
66. I have not used the electronics knowledge very often.
67. I believe that not being ABET accredited is the least valuable part.

Question 26 Reponses;

1. If you have to add math to make it an Engineering degree do so, but I wouldn't take any hands-on stuff away.
2. Keep adding to the knowledge of the program and require internships. One between junior and senior year and after senior year.
3. Q 25. I run into so many engineers that don't know how to draw a simple sketch of their thoughts. A free body diagram of a problem is usually the best I get. Draw a cube with detail . . . forget it.
4. Q18. I would have commented better if the instructors weren't hired two weeks before our class started. My electronics teacher was a "kid" with a Masters in EE and an arrogant attitude. According to him we all should have had a lot more knowledge before taking the class. All in all, some instructors were good, some were great, and some were BAD.

5. Add some more manufacturing based courses. There are many things that students are not coming away with. How to bend sheet metal! Also 3D modeling. To find someone proficient in 3D software usually requires an experienced individual. To be able to hire a college grad with that experience would greatly help. Experienced people are set in their ways and usually don't want to relocate to BR. Manufacturing site visits. The whole time I was at Ferris we never once visited a manufacturing site.
6. WRT Q20-Q22, if I wanted an ABET accredited degree I would have gone to a different school. It is good for students to have Ferris as an option. If Ferris programs become ABET accredited they will become like everyone else which isn't what you want . . . or is it?
7. I didn't end up taking the prototypical path of a Product Designer so some of these questions didn't apply to me the same way they would to others, but I found several of the classes in the course useful in my career.
8. Have participated in local high school career day events and encouraged students to inquire about FSU's PDET program, as is. Feedback from students to their academic counselors (then passed along to adult participants) reflected the student's interest in obtaining info about the program. They are largely unaware of its existence and curious about it being a fit for them.
9. Foreign language has been an obstacle (French and Spanish) given the global economy/outsourcing. I will need to pick up courses in these subjects and wish I had acquired these tools as many of my likewise international peers already possess these skills.
10. If you are going to teach CAD, the systems being taught should be in widespread industrial use. CATIA, IDEAS, etc.
11. Calculus, physics, chemistry should all be required prior to entry into the program. This would serve to eliminate students who are not sure if they want to be in the program or not.
12. In my experience, the hands-on practicality gained at Ferris has made me a "go to" person for field engineering requiring rapid problem solving, most engineers shy from or can't handle. Computers do the math, they can't do the work. Except for my current position (Engineering Firm) at all other companies I've worked for all engineers have been Ferris graduates.
13. Become, at least, TAC ABET. Frankly I think the program prepared me very well, however I have met some road blocks by having a degree that is not ABET. Intellectual snobbery.
14. I think the PDET program is a great program already. If anything should be added or changed, I think there should be more "shop time" so the students have a better idea of how things are made and what types of processes are available. I think students would be much better designers if they were exposed to this.
15. Update prototype class to utilize current technologies. More ergonomic, DFMA, pneumatics and hydraulics content. Better adjunct instructors.
16. I think that the program was very well put together. I took all of my classes in GR and the instructors were very understanding about work and travel schedules.
17. Prof. xxxx, Do you still need photos of my senior design project? Hope to see you in the near future.
18. Observation: I was not aware that the PDET program was still around, the program is never recognized in the Ferris Technology magazines that I receive in the mail.
19. I work in automatics so DFMEA, PFMEA process flows, control plant are very heavily used. PLM (product lifestyle mgt) is hot now.
20. The more hands-on and real-world the classes are the better. Nothing can train a person's mind to think for itself until it knows what it can do with its own two hands.
21. See Q16
22. I don't think I could have made it through an engineering program. Business wants people we can get the job (whatever that may be) done. If you are only good at engineering, your career is limited. Getting the job done means wearing a lot of hats. I cannot over emphasize people skills.
23. Make it ABET. More math/science. Less English classes/general ed. Make it more satisfactory for job searches. Change name to Mechanical Design Engineering. Some companies never heard of PDET. Many know the plastics program.
24. Mandatory internships.
25. By not being ABET accredited, it seriously limits the further education choices, which in turn further limits career choices. I don't think it's right though.

26. Educate employers what PDET is! I don't know how many times/interviews I had to explain what PDET was! This could be something the students get involved with.
27. It would be nice to be able to offer both PDE and PDET programs. Each have their pros and cons. If someone were able to complete both programs, building one off of the other, I believe they would eliminate the cons from either/both of the separate programs. Perhaps offer 1 or 2 year programs for graduates which will add curriculum from the other program.
28. It has been essential in my professional experience to utilize Microsoft Office software. Excel, Visio and Project are great to know when tracking, planning, presenting, or reporting to management via graphs/metrics. It may be possible to implement a few other aspects of engineers into the program. I've found that in larger companies, many engineers have nothing to do with design. Implementing configuration, material ordering, cost utilization, planning/scheduling, and ISO process are all as important as design.
29. Excellent program – may be beneficial to include a management course.
30. Get better instructor diversification. Having 1 instructor weakens chance for all students to have equal chance in curriculum!
31. I believe I am not using much of my PDET degree in the manufacturing environment except for some light ergonomics and solid modeling. I mainly rely on my MET classes and heavily on electronics, PLC's.
32. In my career, I have learned a lot of hydraulics information that was barely touched during the PDET program.
33. In my experience companies prefer industrial designers or mechanical engineers, not PDE.
34. I find now that having non-calculus based classes is much more useful in the "real world." Design for mfg. class upgrade would be very useful – understanding of stamping, roll-form, etc . . . similar to plastics material class. Program is good as is but did/does limit possibility of obtaining some masters programs (MME – U of M)
35. I can't stress enough how important it is for the PDET student be able to "sell" him or herself at the time of interview when faced against an ME grad but it can be done and many of us have won! Push the advanced degrees.
36. I would recommend a foreign language. At least one year.
37. It would have been nice to have an ergonomics class as opposed to ergonomics/statistics.
38. Better internships.
39. I recommend two changes to the PDET program. 1) To use actual CAD and CAE programs that are used most commonly in industry today. I highly recommend CATIAVS and ANSTS FEA. 2) I would choose a product that could be used in each course. Keep these assignments to be used as a portfolio. This would be very impressive to have a portfolio that showed ones capabilities on a job interview.
40. Free course for fundamentals of engineering.
41. I have been trying to find a way to take a course at Kendall in sketching/rendering for over a year now. The struggle is due to changes at work constantly impacting whatever way I could work the course into my daily schedule.
42. Internships; More in-depth understanding of solid modeling in industry; Possible hands-on labs; Overall, great program, would recommend to anyone.
43. Ferris needs to change to an accredited engineering program. Lack of a accredited degree was a major stumbling block in my attempt to obtain relevant employment. On most job interviews, prospective employers told me they were looking for BSME graduates. Basically, I have been told that my degree is a glorified drafting degree. To make matters worse, on interviews for drafting positions I was told that I was over qualified. After 16 years, there has been no change. Unfortunately, the job market is extremely competitive, and the Product Design graduates are woefully outclassed when compared to those form Michigan State or MTU, for instance. I graduated with highest honors, at the top of my class with a GPA of 3.76, in 1990, and I'm still looking for work. Many of the graduates in the first year either went back to drafting, or continued their education in order to find actual engineering work. The senior project should be a major group project that better showcases the program's objectives. It seems that industry is more interested in how you work together in a team than how well you can design something on your own. Internships should involve more than one short summer assignment. It would be preferable for students to complete two to three summers of progressive work experiences. It would probably

be better if one semester of the program were devoted exclusively to a RELEVANT professional internship. Continuing education opportunities should be available and communicated to graduates. Industry standards in computer-aided design evolved rapidly after I graduated, and an opportunity to update my skills in that area would have been extremely valuable in my employment search. However, I was unaware of any specific updates that the program had made, or how to access those opportunities. The PDET program, in cooperation with the placement office should set up more industry job fairs and on-campus interviews. Though in all fairness, I don't really believe that industry is very interested in the PDET program. If the PDET program is going to change to an accredited engineering program, it will have to also make a huge effort to promote that program change to industry. The program will also have to gather input from industry, and then implement those ideas in a timely manner to better stay ahead of future industry needs.

44. If I could add something to the program I would require internships in order to graduate. The thing that made it hard finding my first job was the lack of experience compared to other graduates.
45. I would add more design projects that would require the use of FEA and more statics.
46. Engineers in today's automatic climate do very little engineering. They do program management. A big help would be adding tooling classes, injection molding and stamping would be valuable. There are enough engineering curriculums.
47. "Testing Systems Analysis" - favorite class; "Machine Design & Adv. Mach. Design" - #2 & 3 – favorite class. I liked how public speaking and art class incorporated the PDET capstone project.
48. I've been a CATIA user for 11 years. It's helped me get a job at Volvo and then Honda. I know it's very expensive, but if there was any way to expose students to CATIA V5, it would definitely help their ability to get a job. Just my 2 cents . . .
49. Due to manufacturing changes I believe some attention should be given to learn manufacturing and the various vocabulary that accompanies it. Design engineers must be aware of these concepts to succeed today. Also, additional emphasis should be placed on developing the student's ability to exist in a work environment, i.e. people skills.
50. You should require students to participate with companies in co-op. This way they can get a better idea of what they will be expected to do once on the job. Plus it will start their work experience, before graduation.
51. More emphasis on job placement – bringing in employers who are hiring. Add internship requirement.
52. Improve articulation with GRCC.
53. I don't believe that any changes need to occur. I was very happy with the way the program went. I am very glad that I chose the PDET program. It has given me what I needed to get the job that I wanted. Thank you very much.
54. Q17 Some of us had excellent work experience prior to college. This is not the norm. Working on a farm, being a back yard mechanic, and working in a plastics machine shop/plant were experiences fast food and commercial work can't meet for this field. I was fortunate. If local shops could apprentice students there would be benefits to both the shop and student. Q19 Both are beneficial (I took both at FSU). ET is not recognized as engineering in the field. Q20 Degree in ET and a minor in math would be exceptional. Q25 Wish I had taken more hands free sketching. College is the time to spend creating those skills. Q26 If you would like a guest speaker at some time, let me know. College (FSU) has been one of the best experiences of my life and business preparation. Thought starters: 1) Where you are and I was; 2) What has been most important in education; 3) How what has been learned is being used; 4) Think now, tomorrow, and beyond.
55. Add a course covering Quality Control. It is tough to design products without having knowledge of inspection criteria versus a given population. Products should be created with achievable dimensional characteristics.
56. Increased emphasis on the importance of internships. Add some lab-view training to the syllabus of one of the classes.

FERRIS STATE UNIVERSITY

3/10/06

Prof. R. Goosen
Product Design Engineering Technology
Ferris State University
Big Rapids, MI 49307

Greetings from Ferris State University,

You have been identified as someone in a position to evaluate the effectiveness of engineering professionals involved in mechanical design. The Product Design Engineering Technology program at Ferris State University is currently in the process of evaluating its effectiveness. Although the program is nearing its 16th year and has over 300 graduates employed primarily in Michigan, it is our practice to periodically evaluate how well the current academic content provides the skills needed in today's workplace. As a knowledgeable industry professional, you are uniquely able to help us complete this evaluation.

Accompanying this letter is a survey that explores various aspects of the current Product Design program. I would be most appreciative if you could take a few minutes to complete the survey and to return it in the self-addressed, postage paid envelope provided. You are welcome to add any additional comments you may have on the back of the last page.

Should you have any questions or require clarification regarding this survey, please feel free to contact me at my office here in Big Rapids (231-591-2635). If you would be willing to discuss your views on the education of mechanical design students or would like additional information regarding the Product Design program here at Ferris State, just include your business card with your response and I will contact you at a later date.

Thank you,

Richard F. Goosen, PE
Professor, Product Design

enclosures

MECHANICAL DESIGN DEPARTMENT
COLLEGE OF TECHNOLOLOGY
Product Design Engineering Technology
915 Campus Drive, SWN 405, Big Rapids, MI 49307-2291
Phone 231 591-2755 FAX 231 591-2271

FERRIS STATE UNIVERSITY

Product Design Engineering Technology
Industrial Survey

The Mechanical Design Department of Ferris State University is conducting a survey of employers of mechanical designers to be used in the continuing development and improvement of the Product Design Engineering Technology program. Please return your survey to Ferris State University, Mechanical Design Department, 915 Campus Dr., Swan 405, Big Rapids, MI, 49307-2291. Thank you for taking the time to complete the survey. Your answers will be of great help in determining the future direction of the program.

Q1 Approximately how many employees work at this facility?

- ☐ Less than 50
- ☐ 50-100
- ☐ 101-500
- ☐ 501-1000
- ☐ Over 1000

Q2 Approximately how many Mechanical engineers/designers work at this facility?

- ☐ None
- ☐ 1-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ Over 100

Q3 What description best fits your company's primary activity? (Please select all that apply.)

- ☐ Manufacturing
- ☐ Design
- ☐ Consulting
- ☐ Other

Please Specify

Q4 Does your company currently have one or more Ferris State University Product Design graduates on staff?

- ☐ Yes
- ☐ No
- ☐ Unknown

Q5 If so, how well do you feel that the FSU graduate(s) was/were prepared to work for your company?

- ☐ Very Unprepared
- ☐ Somewhat Unprepared
- ☐ Somewhat Prepared
- ☐ Very Prepared

Q6 **The following are the major subject areas in Ferris State University's Product Design Engineering program. Please indicate the relative importance you feel that this subject/skill would have if you were seeking to hire a recent graduate for your technical staff.**

	Very Unimportant	Somewhat Unimportant	Neutral/Not familiar with	Somewhat Important	Very Important
Geometric Dimensioning & Tolerancing	☐	☐	☐	☐	☐
Basic Material Science	☐	☐	☐	☐	☐
Designing with Plastics	☐	☐	☐	☐	☐
Designing with Metals	☐	☐	☐	☐	☐
Engineering Statics	☐	☐	☐	☐	☐
Engineering Dynamics	☐	☐	☐	☐	☐
Chemistry	☐	☐	☐	☐	☐
Physics	☐	☐	☐	☐	☐
Finite Element Analysis	☐	☐	☐	☐	☐
Failure Mode Effects Analysis	☐	☐	☐	☐	☐
Design for Manufacturing	☐	☐	☐	☐	☐
Machine Design	☐	☐	☐	☐	☐
Thermodynamics	☐	☐	☐	☐	☐
Fluid Mechanics	☐	☐	☐	☐	☐
Basic Electronics	☐	☐	☐	☐	☐
CAD Solid Modeling	☐	☐	☐	☐	☐
Ergonomics	☐	☐	☐	☐	☐
Statistics	☐	☐	☐	☐	☐
Product Rendering & Sketching	☐	☐	☐	☐	☐
Manual Drafting	☐	☐	☐	☐	☐
Industrial Psychology	☐	☐	☐	☐	☐
Applied Calculus	☐	☐	☐	☐	☐

Q7 **Which software package(s) do you use for the mechanical component CAD design and documentation? (Please select all that apply.)**

- ☐ AUTOCAD
- ☐ PRO-E
- ☐ CATIA
- ☐ UNIGRAPHICS
- ☐ SOLID WORKS
- ☐ Other

Please Specify:

All PDET students at Ferris are required to complete an individual design project during their senior year. The project consists of designing a new product or making major modifications to an existing product. The requirements for this project include a technical proposal, time & material estimating, design and documentation, periodic status reports, a formal written technical report, construction of a prototype, and individual formal presentations to an industrial review panel.

Q8 Overall, would you consider this an important activity?

- ☐ Very Unimportant
- ☐ Somewhat Unimportant
- ☐ Somewhat Important
- ☐ Very Important

Q9 In addition to mechanical design and documentation, each senior project is intended to develop the following skills. Please rate the importance you would place on each skill.

	Very Unimportant	Somewhat Unimportant	Somewhat Important	Very Important
Proposal Preparation	☐	☐	☐	☐
Estimating and Budgeting	☐	☐	☐	☐
Written Status Reporting	☐	☐	☐	☐
Conducting Design Reviews	☐	☐	☐	☐
Formal Written Report	☐	☐	☐	☐
Technical Presentation	☐	☐	☐	☐
Project Management	☐	☐	☐	☐
Prototype Development	☐	☐	☐	☐

Q10 During the last year, has your company experienced difficulty in hiring qualified mechanical designers?

- ☐ Yes
- ☐ No
- ☐ Don't know/Not applicable

Q11 Please indicate your best estimate describing the growth potential for mechanical design at your company during the next year.

- ☐ Probable reduction in staff
- ☐ Average/Steady
- ☐ Probably increase in staff

Q12 Are you familiar with the differences between Engineering and Engineering Technology B.S. degree programs?

- ☐ Yes
- ☐ No

Q13 When hiring a new graduate for a mechanical design position, which type of degree do you prefer? (Please select only one.)

- ☐ Engineering Technology
- ☐ Engineering
- ☐ No Preference

Q14 Are you familiar with ABET-TAC and ABET-EAC accreditation?

- ☐ Yes
- ☐ No

Q15 Please use this space to provide any additional comments or suggestions you have regarding the PDET program at Ferris State University.

Thank you for your time and assistance.

FINAL SURVEY – PDET SENIORS 2006

1. What is your Associates Degree background (circle); ASMET ASTD Other FSU AS Non-FSU AS

The following courses make up the standard PDET program.

Fall 3rd year	Winter 3rd year	Fall 4rd year	Winter 4th year
PDET 311 Seminar	PDET 321 Dynamics	PDET 411 Machine Design	PDET 499 Senior Project
PDET 312 GD&T	PDET 322 ProE	PDET 412 Ergonomics	PDET 422 FEA –MECH./ANSYS
EEET 201 Electronics	MFGE 352 Design for Mfg	PDET 413 Thermodynamics	
MECH 340 Statics	PLTS 342 Plastics	MATL341 Metals	COMM 336 Presentations
ARTS 101 Art	MATH 216 Applied Calc.	PDET 415 Adv. PRO E	Social Awareness 200+
CHEM 103 Chemistry	PSYC 150 Psychology	ENGL 321 Adv. English	CE 200+elective

2. What course did you take for the 200+ Cultural Enrichment elective _____

3. Would you recommend this course for future PDET students YES NO

4. In your opinion what are the most difficult courses in the PDET program (you can include any courses taken as technical electives)

5. In which courses did you learn the most?

6. In which courses did you learn the least?

7. Which courses did you enjoy the most?

8. In your opinion, what is (are) the best course(s) overall in the program?

9. In your opinion, what is (are) the worst course(s) overall in the program?

PLEASE TURN OVER AND COMPLETE THE BACK

10. OVERALL HOW SATISFIED ARE YOU WITH YOUR ACADEMIC ADVISING

5	4	3	2	1
Very Satisfied		Moderately Satisfied		Not Satisfied

11. OVERALL HOW SATISFIED ARE YOU WITH YOUR EDUCATION IN THE PDET PROGRAM

5	4	3	2	1
Very Satisfied		Moderately Satisfied		Not Satisfied

12. The Project Presentation is a major aspect of the PDET Program. Please evaluate the way this years final presentation was conducted.

GOOD AS IS NEEDS IMPROVEMENT (please describe a problem area and how you would fix it)

Your class was required to have a laptop computer. Many of the lessons learned in implementing the laptops with prior classes have been used to improve many of the procedures and policies associated with this requirement.

12. Overall do you think it is a good idea for the PDET Program to continue to use the PRO ENGINEER SOFTWARE YES NO

13. Overall do you think having PRO ENGINEER SOFTWARE experience will help you get a job? YES NO

14. Overall do you think that PDET classes using student owned laptop PCs are:

1	2	3	4	5
A good idea				A bad idea

Please feel free to add any comments or recommendations about any aspect of the PDET program in the space below.

FINAL SURVEY – PDET ATC SENIORS 2006

1. What is your academic background before starting the PDET Program;

Associates degree (what was your major and where did you complete it and when did you complete it

Major_____ Where _____ When _____

No Associates Degree _____

The following courses make up the standard PDET program.

PDET 311 Seminar	PDET 321 Dynamics	PDET 411 Machine Design	PDET 499 Senior Project
PDET 312 GD&T	PDET 322 ProE	PDET 412 Ergonomics	PDET 422 FEA –MECHANICA
EEET 201 Electronics	MFGE 352 Design for Mfg	PDET 413 Thermodynamics	HSET 403 (no longer required)
MECH 340 Statics	PLTS 342 Plastics	MATL341 Metals	COMM 336 Presentations
ARTS 101 Art	MATH 216 Applied Calc.	PDET 415 Adv. PRO E	Social Awareness 200+
CHEM 103 Chemistry	PSYC 150 Psychology	ENGL 321 Adv. English	CE 200+elective

2. In your opinion what are the most difficult courses in the PDET program (you can include any courses taken as technical electives)

3. In which courses did you learn the most?

4. In which courses did you learn the least?

5. Which courses did you enjoy the most?

6. In your opinion, what is (are) the best course(s) overall in the program?

7. In your opinion, what is (are) the worst course(s) overall in the program?

PLEASE TURN OVER AND COMPLETE THE BACK

10. OVERALL HOW SATISFIED ARE YOU WITH YOUR ACADEMIC ADVISING

5	4	3	2	1
Very Satisfied		Moderately Satisfied		Not Satisfied

11. OVERALL HOW SATISFIED ARE YOU WITH YOUR EDUCATION IN THE PDET PROGRAM

5	4	3	2	1
Very Satisfied		Moderately Satisfied		Not Satisfied

12. The Project Presentation is a major aspect of the PDET Program. Please evaluate the way this year's final presentation was conducted.

GOOD AS IS NEEDS IMPROVEMENT (please describe a problem area and how you would fix it)

13. Overall do you think it is a good idea for the PDET Program to continue to be based on PRO ENGINEER SOFTWARE

YES NO

14. Overall do you think having PRO ENGINEER SOFTWARE experience will improve your employment prospects? YES NO

15. On campus PDET students are required to have their own laptop computer. The required software is loaded and licensed on their PC as long as they are in the program and computer lab exercises are conducted in a regular classroom not a CAD lab. While this is an additional expense, it provides students with access to the software at any time and place. What do you think of requiring off campus PDET students to have their own laptop PCs:

1	2	3	4	5
A good idea				A bad idea

Please feel free to add any comments or recommendations about any aspect of the PDET program in the space below.

FERRIS STATE UNIVERSITY
Product Design Engineering Technology
Advisory Board Survey

The Design & Manufacturing Department is conducting a survey of the Advisory Board for use in the continuing development and improvement of the program. Please return your survey to Ferris State University, Mechanical Design Department, 915 Campus Dr., Swan 405, Big Rapids, MI, 49307-2291. Thank you for taking the time to complete the survey. Your answers will be of great help in determining the future direction of the program.

Q1 **The following statements provide a review of instructional aspects of the program. *For each statement, please indicate your level of agreement.***

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree	Not Sure
Instructional content reflects what is needed to be successful in today's workplace.	☐	☐	☐	☐	☐
Instructors possess knowledge of and teach current practices.	☐	☐	☐	☐	☐
Instructional equipment is adequate for the instruction provided.	☐	☐	☐	☐	☐
The PDET program provides students with practical skills & knowledge experiences.	☐	☐	☐	☐	☐
Instructional facilities are conducive to learning.	☐	☐	☐	☐	☐
The Senior Project is an effective assessment tool.	☐	☐	☐	☐	☐

Q2 **The following statements provide a review of program graduates. *For each statement, please indicate your level of agreement.***

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree	Not Sure
Ferris PDET grads are comparable in performance to grads from other institutions.	☐	☐	☐	☐	☐
Ferris PDET grads contribute as much as other grads in their first 6 months of employment.	☐	☐	☐	☐	☐
Ferris PDET grads are well-prepared to enter the workforce.	☐	☐	☐	☐	☐
Adequate placement assistance is provided to graduates.	☐	☐	☐	☐	☐
There are job opportunities available for Ferris PDET grads.	☐	☐	☐	☐	☐

Q3 Are you aware of any alternative assessment tools that could be used in place of/conjunction with the Senior Project?

- ☐ Yes
- ☐ No
- ☐ Not Sure

Q4 Please indicate those alternatives here.

Q5 What, if any, changes would you like to see made to the Senior Project?

Q6 Which, if any, courses would you like to see added to the program?

Q7 Which, if any, courses would you like to see removed from the program?

Q8 What, if any, changes would you like to see made to the program?

Q9 Overall, how satisfied are you with the PDET program at Ferris State University?

- ☐ Excellent as it is currently, no changes required
- ☐ Good as it is currently, but could be improved by some minor changes
- ☐ Adequate as it is currently, but some changes are recommended
- ☐ Marginal as it is currently, but could be improved by program changes
- ☐ Inadequate currently, and not likely to be salvageable by program changes.

Q10 Please use this space to provide any additional comments or suggestions.

If you think further discussion would help to emphasize or clarify your evaluation, you may include your name and you will be contacted by the program faculty.

Thank you for taking the time to assist us in our efforts to improve the PDET program.

If there is additional information about the PDET program that you would find valuable, but was not provided, please identify below what you would like to know and we will answer your question or provide you with additional material via e-mail.

Name:

Title:

Company:

Office Phone:

Cell Phone:

E-mail:

PRODUCT DESIGN ENGINEERING TECHNOLOGY
ADVISORY BOARD MEETING NOTES
September 23, 2005 Meeting

Board Members Attending: J. Battey, T. DeKievit, D. Eenigenburg, S. Finney, W. Gerding, R. Glover, W. Gooch, B. Kooistra, L. Myers,

Board Members Absent: R. Scott

Faculty Members Attending: W. Koepf, R. Goosen

Old Business.

PDET Associates Degree. Discussed difficulty in developing a four year option for the PDET program by adding the first two years based on the FSU CAD associates degree. No progress noted to date but after initial rejection of the concept by the CAD dept., some support has been recently noted. This effort is to be continued with the caveat that PDET program entrance requirements will still remain oriented on attracting transfer students.

Laptop Initiative. Requirement that PDET students purchase laptop computers for classroom use was reported as being quite successful with a high level of student acceptance. Recent indications are that, based on the PDET pilot experience, similar requirements may be introduced in other College of Technology programs.

Rendering and Sketching Course. Joint efforts with the FSU Art dept. to develop such a course were described as unproductive to date but continuing. The need to develop sketching skills to aid in manual 3D conceptualization was identified as a needed element for product designers. The need to replace the existing Art class with the new sketching class to remain within FSU general education requirements was explained. The option of replacing this with Kendall Industrial Design course was described as not viable. This effort will be continued.

Linkage with Grand Rapids Companies. Efforts to increase sponsorship of the PDET program among Grand Rapids employers were described as unsuccessful except for some senior project sponsorship with Fredrick's Design and Rapistan/DEMAG/Siemens. Characteristics of projects likely to produce a successful sponsorship were discussed. Negative local economic climate for PDET specialty areas was noted as a limiting factor. Suggestions to develop a co-op internship program similar to GVSU will be explored further. Advisory Board was encouraged to submit potential industry based student projects for use as PDET senior projects particularly in the fall time frame.

Addition of Quality Planning Instruction. Quality planning has been added to several PDET program courses in response to this suggestion from the last Advisory Board meeting. The option to add a specific course for this purpose was determined to not be feasible within the current PDET program.

ID – PDET Integrated Program. The idea of developing a unique program blending artistic skills from Kendall's Industrial Design dept. and the technical skills of the FSU PDET program has been discussed on multiple occasions with the Kendall ID faculty and various levels of administration. Exploration of an ID certificate option will be considered as an alternative. The administration, while outwardly supportive of such a program, has been unwilling to take action. Kendall ID faculty seems reluctant to participate because they are unwilling to risk potential changes with their current program. Contractual issues involving faculty salary differential and tuition are also involved. This effort will continue as opportunities for promoting the concept are encountered.

New Business.

PDET – MET Differentiation. The need to increase meaningful differences in program content between the PDET program and the recently implemented Mechanical Engineering Technology BS degree program was discussed. Currently the two programs differ by only a handful of courses and PDET graduates are being placed at a disadvantage among potential employers who are not familiar with the PDET program. This will be a continuing and significant issue until the independent identity of both programs has been established to potential employers.

Plan to Increase Transfer Enrollment. Declining transfer student enrollment was discussed as a major problem area. Identified sources of the problem include poor marketing by the university and a decline in qualified applicants. A new effort to increase transfer student applicants by establishing a direct faculty to faculty interface with the CAD depts. of Michigan community colleges was described. Direct mailings to community college students, supported by advertisements/posters placed in targeted schools, was suggested. For longer term development of prospects it was suggested that some information about the PDET program be sent to Voc-Ed schools in the region. In addition efforts will be made to improve internet accessibility of the PDET program. These activities will be a high priority during the immediate future.

2006 Senior Project Reviews. The board was informed that PDET senior project reviews for both on-campus and Grand Rapids students will be held in late April 2006. On-campus students will present their projects on a Saturday and Grand Rapids students will present their projects on a series of weekday evenings. Advisory board members will be contacted and invited to participate as reviewers when the dates are established. Advisory board members are also encouraged to submit any potential projects for consideration as PDET senior projects.

Studio Space. The idea of requesting a dedicated studio area for PDET students to use in developing their senior projects was presented to the board. This will be submitted to FSU administration during next year's planning process.

Other items. The following ancillary items were also discussed.

- No major changes in the PDET course sequence or content were made by the board. Several small changes in content were recommended for consideration by the program faculty.

- The use of Pro-Engineer CAD software as the basis of the program remains acceptable.

- A raffle/lottery was suggested by the board as a way to increase the response from this year's student surveys. The use of a major prize for the drawing winner as well as smaller rewards for all respondents will be incorporated into the survey activity. Small prizes (such as mugs, sports tickets, etc), in addition to the major prize, was recommended. An additional recommendation to encourage responses was to provide results of the survey to those who responded.

- It was recommended to include placement agencies as part of the survey of companies likely to employ PDET graduates.

- The next Advisory Board meeting will be in Grand Rapids in the evening. Target date will be early fall of 2006.

Summary. The advisory board meeting was a positive and constructive activity for both the board members and the PDET program faculty. Several excellent ideas as to possible ways to address needed changes will be implemented during the next year. The Advisory Board members are sincerely thanked by the program PDET faculty for their willingness to participate in improving the program.

APPENDIX C

Supporting information for Section 3 – Program Profile

9/26/05

Administrative Program Review
Program: Product Design Engineering Technology

Purpose of Administrative Program Review

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

Instructions: Please prepare a report following the outline below:

I. Summary of modifications since last report:

a) *There have been no curriculum changes or staffing changes since the last report.*
b) *An improved assessment system for solid modeling transfer students has been developed and implemented.*
c) *The definition of requirements for a new PDET service course for the MFGE and MFTD programs has been developed.*
d) *New software licensing with PTC incorporated has been developed and implemented.*
e) *A new initiative to encourage transfers from Community Colleges is in development.*

Program Assessment/Assessment of Student Learning

a. What is the program's learning outcomes?

The educational objectives of the Product Design Program are to provide each graduating student with;

a) *An appropriate mastery of the knowledge, skills required to design and document mechanical products using both manual and computer based methodologies.*
b) *An ability to apply mathematics, science and mechanical engineering fundamentals to support mechanical design activities.*
c) *An advanced knowledge of three dimensional solid modeling of mechanical components and assemblies.*
d) *A familiarity with estimating project costs and schedule development.*
e) *A mastery of Geometric Dimensioning and Tolerancing (GD&T) standards and techniques.*
f) *The ability to apply relevant anthropometric data using fundamental statistical practice in the design of products.*
g) *The ability to develop product design requirements adequate to concept, design and manufacture mechanical products to meet a specific need.*
h) *An ability to communicate effectively.*
i) *A recognition of the need for, and an ability to engage in, lifelong learning.*
j) *An ability to understand professional, ethical and social responsibilities.*
k) *A respect for the diversity and a knowledge of contemporary professional , societal and global issues.*

b. What assessment measures are used, both direct and indirect?

Evaluation Instrument	Status	Frequency
1. Course Survey Instruments (SAI)	In place now	Each semester selected courses
2. Projects and Presentations	In place now	Ongoing - included in at least one PDET course per semester
3. GD&T entering and exit assessment tests	In place now	Each GD&T course
4. Student surveys of laptop based CAD courses	In place now	Each laptop PC CAD course
5. Graduating student program assessment	In place now	Winter semester, 4th year
6. Course performance records	In place now	Ongoing in all PDET classes
7. Faculty program assessment	In place now	Regular meetings at program, dept. and college level
8. Alumni program assessment	In place now	Periodic - 5 year cycle
9. Employer assessment	In place now	Periodic - 5 year cycle
10. Industrial Advisory Board program assessment	In place now	Periodic - 2 year cycle
11. Academic program review	In place now	Periodic - 5 year cycle
12. Administrative program review	In place now	Annual
13. Post tenure faculty review	In place now	Periodic - 5 year cycle
14. General education outcomes assessment	In place now	Periodic by university committee

Assessments are conducted on an ongoing basis. Assessment results have been used to change course content, teaching methodologies and program policies such as required program equipment and course transfer policies. The results of some course outcomes, such as projects and presentations are used by the program's industrial advisory board as the basis of their review.

Course Outcomes Assessment

a. Do all multi-sectioned courses have common outcomes? *Yes*
b. If not, how do you plan to address discrepancies?
c. How do individual course outcomes meet programmatic goals?*All program courses and the specified outcomes directly target the development of the skills necessary for the concepting, design and documentation of mechanical products as utilized in contemporary industrial practice.*

II. Program Features

1. Advisory Board

a. Does the program have a board/committee? When did it last meet? When were new members last appointed? What is the composition of the committee (how many alumni, workplace representatives, academic representatives, etc.) *The industrial advisory board last met in September 2005. At this time four new members were appointed creating a board of 10 members. All members are employed in a product design or product design related capacity. There are no academic representatives. The board has seven program graduates and three non-graduates. Of the program graduates on the board, three are graduates of the on-campus program and four are graduates of the off-campus program. The board has three female members and seven male members, a ratio that slightly exceeds the typical female enrollment percentage of the program.*

b. Has feedback from the Advisory Board affected programmatic or curricular change? *The input of the industrial advisory board has been used to direct new program initiatives and to alter program course content.*

2. **Internships/Cooperative or Experiential Learning**
   a. Is an internship required or recommended? *An internship is recommended but not required.*
   b. If the internship is only recommended, what percentage of majors elect the internship option? *More than 50% of program students participate in summer industrial employment applicable as a professional internship without enrolling in an internship course.*
   c. What challenges does the program face in regard to internships? *Developing meaningful internship responsibilities is difficult and limited by regional economic conditions.* What is being done to address these concerns? *Internship opportunities are solicited from industrial contacts and then offered to the students as they become available.*
   d. Do you seek feedback from internship supervisors? If so, does that feedback affect pedagogical or curricular change? *Not applicable.*

3. **Online Courses**
   a. Please list the web-based courses, both partial internet and fully online, offered last year. *No program courses were offered using an online or partially on-line format.*
   b. What challenges and/or opportunities have web-based instructions created? Not applicable.
   c. What faculty development opportunities have been encouraged/required in order to enhance web-based learning within the program? *None*
   d. How has student feedback been used to enhance course delivery? *Not applicable*
   e. Is there any plan to offer this program online? If yes, what rationale is there to offer this program online? (emerging market opportunity? expand enrollment? demand for niche program offering? etc. *There are no plans to offer this program on-line.*

4. **Accreditation**
   a. Is the program accredited or certified? *No. The product design program and its curriculum do not match any existing accreditation categories of either ABET – TAC (engineering technology) or NASDAD (industrial design).*
   b. By whom?
   c. When is the next review?
   d. When is the self-study due?
   e. How has the most recent accreditation review affected the program?

5. **Student/Faculty Recognition**
   a. Have students within the program received any special recognition or achievement? *Two students each year typically receive recognition by inclusion in the "Who's Who" of colleges and universities. One student each year is recognized as the outstanding program graduate.*

b. Have faculty within the program received any special recognition or achievement? *William Koepf (Asst. Prof. Product Design) completed a Master's Degree in Engineering Management from Western Michigan University and received tenure. R. Goosen (Prof. Product Design) was promoted to full professor. Faculty are active members of ASEE, IEEE and IDSA organizations.*

6. Student Engagement

a. Is volunteerism and student engagement a structured part of the program? *Students are encouraged to become members of the Society of Automotive Engineers. A softball game is held each Fall to develop student engagement.*
b. Does the program utilize service learning in the curriculum? *No*
c. Does the program participate in the American Democracy Project? *This project is unknown to the program faculty.*

III. Academic Program Review Recommendations

Please indicate the recommendations (enhancements or changes) made by APRC in the most recent review of the program by the APRC council. What actions have been taken in response to these recommendations?

The most recent Academic Program Review, completed in Fall 2000, made the following recommendations;

APR Recommendation	Action
1. Enhance the program by providing integrated computer laboratory/classroom.	*Completed in Winter 2002.*
2. Enhance the program by incorporating Pro-Engineer solid modelling software.	*Completed software incorporated in Winter 2001.*
3. To maintain high quality a dual BS/BFA program should be developed in conjunction with Kendall Industrial Design	*Meetings were held with campus administration, Kendall administration and Kendall ID faculty. Although all agreed it would be a good idea, the new program has not received any support outside of the PDET program faculty.*
4. To maintain high quality the university must provide resources to promote the program.	*University resources have been offered but teaching load of the PDET faculty has precluded utilization.*
5. To maintain high quality the university must support faculty attendence at appropriate industrial meetings.	*Teaching load of the PDET faculty has prevented attendance at these meetings.*
6. To maintain high quality the faculty should develop a marketing program for potential employers of program graduates.	*University resources have been offered but teaching load of the PDET faculty has precluded utilization.*

Areas of strength:

PDET faculty (2 members) graduate approximately 20 students annually on campus each year with more than 90% of entering students graduating within two years. An off-campus segment of the program (in Grand Rapids) graduates 30 additional students every three years. For more than the last five years PDET faculty have been among the leading producers of Student Credit Hours (SCH) within the College of Technology. All PDET faculty members actively participate in professional development activities and all PDET faculty have completed graduate degrees at institutions other than FSU. The PDET program has among the lowest number of program specific courses of any degree program within the College of Technology. The PDET program was the first academic program at FSU to implement laptop computer based instruction. During the last five years the PDET program has successfully developed this program which reduces university computer expenses (hardware and software) as well as allowing classroom space to be used for both laboratory and lecture purposes. No university computing resources (equipment and/or technician support) have been used for PDET program instruction in the last six years.

Areas of concern (and proposed actions to address them):

a. Transfer student enrollment has decreased over the last 10 years. Although the PDET program has a large number of students eligible to transfer from community college CAD programs, indications are that potential applicants have a great deal of difficulty in finding the PDET program at FSU. Aside from the obvious need to improve university marketing activities in this area, PDET program faculty have initiated a program of direct contact with targeted Community Colleges.
b. The recent creation of the BSMET degree (with very similar course content and professional focus to the Product Design program) has reduced the recognition and access of the program to potential employers of mechanical designers. This has limited some employment opportunities for Product Design program graduates. In addition the creation of this degree has effectively eliminated transfer students from the Mechanical Engineering Technology AS degree to the Product Design program and this has reduced program enrollment. To address this problem, the Product Design Program is attempting to develop curriculum changes to differentiate the PDET and MET BS programs.
c. The creation of several degree programs by Ferris Grand Rapids has dramatically reduced the number of applicants to the off-campus Product Design program. This has been the result of two changes in the off campus market. 1) The new FSU-GR Bachelors of Applied Science (BAS) degree program with lower entrance requirements and a less demanding curriculum which offers potential off-campus students easier access to a baccalaureate degree. 2) The creation of an FSU-GR marketing and advising staff that prioritizes directing students to FSU-GR created degree programs over Big Rapids based programs. FSU-GR activities are outside the control of the Product Design program and can only be addressed by changes in institutional direction. Aside from creating an awareness of these problems that threaten the off-campus program, no corrective actions are planned by the program faculty.

Future goals:

See the described actions to address the Areas of Concern. In addition the PDET program is attempting to identify and develop courses that are of interest to other college programs. This has been somewhat successful in creating service courses in solid modeling for the Manufacturing Engineering Tech.(started F04) and Mechanical Engineering Tech.(to start W06 programs.

Other recommendations:

Richard Goosen
Department Chair

14 Nov 05
Date

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

PRODUCT DESIGN ENGINEERING TECHNOLOGY
BACHELOR OF SCIENCE DEGREE
FALL SEMESTER
Curriculum Guide Sheet

BS Degree Minimum General Education Requirements

(See the General Education webpage at www.ferris.edu/HTML/academics/gened/gened.html for details and acceptable courses in each program)

Communications Competence: 12 semester hours

Quantitative Skills: MATH 115 or ACT score

Scientific Understanding: 7/8 semester hours, including at least one lab course

Cultural Enrichment: 9 semester hours, including at least one course 200 level or higher.

Social Awareness: 9 semester hours, including at least one Foundation course and at least one course 300 level or higher.

At least one Global Consciousness (G) course and one Race/Ethnicity/Gender (REG) course (within Cultural Enrichment or Social Awareness)

Meeting all requirements for graduation is the student's responsibility. Your advisor is available to assist you.

Total semester hours required for graduation: 65

			CREDITS/GRADE
THIRD YEAR - FALL SEMESTER			
PDET	311	Seminar in Product Design	1
PDET	312	Advanced Tolerancing	2
EEET	201	Electrical Automation	3
MECH	340	Statics and Strengths of Materials (PHYS 211)	4
ARTS	101	Basic Art (Cultural Enrichment)	3
CHEM	103	Chemistry (Scientific Understanding)	3
THIRD YEAR - WINTER SEMESTER			
PDET	321	Applied Mechanics and Kinematic	3
PDET	322	Model and Prototype (CAD Competency)	2
MFGE	352	Design for Manufacturing	2
PLTS	342	Material Selection Plastics	3
MATH	216	Applied Calculus (MATH 126)	4
PSYC	150	Introduction to Psychology (Social Awareness)	3
FOURTH YEAR - FALL SEMESTER			
PDET	411	Machine Design	3
PDET	412	Statistics/Ergonomics	2
PDET	413	Applied Fluids and Thermodynamics	3
MATL	341	Material Selection Metals (MATL 240)	3
PDET	415	Advanced Solid Modeling CAD (PDET 322)	2
ENGL	321	Adv. Composition (ENGL 250/211) [Comm. Competence]	3
FOURTH YEAR - WINTER SEMESTER			
PDET	499	Product Design Project (Capstone Assessment)	3
PDET	422	Advanced Machine Design with FEA	4
PSYC	326	Industrial/Organizational Psychology (PSYC 150) [300 Social Awareness]	3
ELECTIVE		Global Consciousness Elective (To be taken in the Cultural Enrichment Subject Area - 200 level). See University Catalog for approved courses	3
COMM	336	Technical and Professional Presentation (COMM 121) (Basic Speech)	3

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FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CURRICULUM REQUIREMENTS
PRODUCT DESIGN ENGINEERING TECHNOLOGY
BACHELOR OF SCIENCE DEGREE
FALL SEMESTER

ENTRY CRITERIA:

1. Associate Degree in Ferris Mechanical Engineering Technology, Technical Drafting and Tool Design, Pre-Engineering or similar approved programs from various transfer institutions.
2. 2.75 honor point average in major coursework.
3. 2.50 honor point average in mathematics coursework.
4. Have taken Math through Algebra & Analytic Trigonometry; example MATH 126 at Ferris.
5. Have taken a basic speech course; example COMM 121 at Ferris.
6. Have completed 6 semester hours of college English; example ENGL 150 & 250 at Ferris.
7. Have completed 3 semester hours in an approved Social Awareness subject area other than Psychology; example areas include Anthropology, Economics, Geography, Political Science, Sociology or Social Science.
8. Have completed General Physics I (PHYS 211).
9. Have completed 3 semester hours in an approved Cultural Enrichment subject area; example areas include Language, Literature and Theater.
10. Basic compentency in CAD.
11. Basic Material Science (MATL 240).

SPECIAL CONDITIONS:

A Any required course listed on the Curriculum Guide Sheet which has been completed before entry into the PDET program must be replaced with approved electives.

B Applicants who fail to meet criteria numbers 4-9 may be admitted to the program; however, courses may need to be taken during the summer between the Junior and Senior year to progress through the program in a timely manner. Credits not taken during the AAS degree must be made up (see Special Conditions "C").

C MATL 240 - Introduction to Material Sciences is a prerequisite for MATL 341 - Material Selection Metals.

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Richard F. Goosen
Assistant Professor
Product Design Engineering Technology
College of Engineering
Ferris State University
Big Rapids, MI 49307 - 2291
(616) 696 - 3045

Education

U.S. Military Academy, West Point, NY, BS General Engineering, 1974.

Kansas State University, Manhattan, KS, BS Electrical Engineering, 1978.

Ohio University, Athens, OH, MS Electrical Engineering, 1985.

Western Michigan University, Kalamazoo, MI, PhD Higher Educational Leadership, ABD.

Professional Experience

Experience with **Ferris State University**, Big Rapids, MI

1993 to Present — Assistant Professor (1993 - 1999), Associate Professors (1999 - 2004), Professor (2004 - Present) – Product Design Engineering Technology. Responsible for teaching engineering technology courses relating to engineering science and mechanical design. Served on various college and university level committees. In 2001 developed the innovative use of CAD instruction on student owned notebook computers. Also provided all academic advising and administrative support for the Product Design program in both Big Rapids and Grand Rapids.

2005 to Present — Mechanical Design Department Chairperson – Responsible for scheduling classes and faculty assignments, developing department budgets, meeting prospective students and various administrative duties associated with department operations.

Experience with **Rapistan Demag** , (currently **Siemens,** formerly **Mannesmann Demag** & **Barrett Vehicle Systems**), Grand Rapids, MI

1989 to 1993 — PRODUCT MANAGER - AUTOMATED GUIDED VEHICLES
Provided General Management for AGVS Product Group. Responsible for design, development, sales, service and installation of Guided Vehicle Systems. Typically designed and installed approximately 100 - 150 vehicles per year for 15 - 20 different customers. Applications included Injection Molding, Paper, Automotive, distribution and warehousing applications.

	1985 to 1989	TECHNICAL MANAGER - AUTOMATED GUIDED VEHICLES Served as Engineering Manager for AGVS Product Group. Responsible for all engineering services supporting the development and design maintenance of AGV products. Areas of primary responsibility included Electronic, Mechanical and Software engineering. Secondary responsibility included the development of Technical and Training materials.
	Experience with **Bell and Howell Inc. - Mailmobile Division**, Zeeland, MI	
	1984 to 1985	PRODUCT AND TRAINING MANAGER for Mailmobile product line of small, mail distribution vehicles for office applications. Responsible for engineering support and product development in addition to the development of training materials.
	Experience with **Lear Siegler - Instrument Division**, Grand Rapids, MI	
	1979 to 1983	AVIONICS SYSTEM ENGINEER responsible for the integration and testing of digital navigation systems for retrofit into existing military aircraft. PROJECT ENGINEER responsible for technical support of a product line of low cost directional sensors for military applications.
Military Experience	**U.S. Army Officer** assigned to Military Intelligence. Various assignments leading small military units, land surveying and as staff security officer. Graduate of Infantry Officers Basic Course and Counterintelligence Officers Course.	
Technical Certification & License	1985 to Present	**Registered Professional Engineer**, State of Ohio
	1992	**Certified Vocational Instructor - Electronics**, State of Michigan
Professional Affiliations	1991 - 1994	**Member ANSI / ASME Standards** **B56.5 Subcommittee -** **Safety Standards For Guided Industrial Vehicles** Responsible for developing safety standards for AGV products and applications. Personally contributed to the development of the current AGVS safety standard, ASME B56.5a-1994.
	1977 - Present	**Member, Institute of Electrical and Electronic Engineers (IEEE)**
	2001 – Present	**Member, American Society for Engineering Education (ASEE)**
	2002- Present	**Member, Industrial Designers Society of America (IDSA)**

William A. Koepf
15175 120th Ave..
Rodney, MI 49342
(231) 867-2098 – Home
(231) 591-5040 – Direct Work

EMPLOYMENT EXPERIENCE:

May 2006 – Present

Intrepid Plastics
Engineering Consultant
*Sales Engineer
*Quality Systems Engineer

August 2000 - Present

Ferris State University
Professor, Product Design Engineering Technology
Instructional Topics:
*ProEngineer 3-D Modeling and Prototype
*Finite Element Analysis using ProMechanica
*Geometric Dimensioning & Tolerancing
*Statics and Strength of Materials
*Ergonomics

March 1998- August 2000

LDM Technologies. Croswell Plant (Formerly BSI)
Manufacturing Engineering Manager
*Managed five employees in the Tooling Department, reduced outside repair costs by 40%.
*Reviewed and approved all mold designs for new programs assigned to the Croswell plant.
*Developed and implemented six automated molding cells reducing cycle times by 10%.
*Coordinated several "Fix Six" teams to reduce defective P.P.M. ' s and increase profitability.
*Attended plant safety committee meetings as the management representative and initiated ergonomics training to identify and reduce repetitive motions.

September 1997 -March 1998

BSI (Croswell), A Division of Huron Plastics Group
Project Engineer Related Duties:
* Assisted in the design and development of new products through customer interface and team interaction.
* Managed several programs through the prototype phase.
* Lead the Advanced Quality Planning team in the timely and accurate completion of several projects.

William A. Koepf

(Page 2)

February 1996- September 1997	Tadim, A Division of Huron Plastics Group ***Program Manager*** *Maintained a desk at the customers facility and assisted their engineering group in the development of new products and procedures. *Directed the build of several prototype and production tools and served as the customer liaison for all tooling Issues. *Lead the Advanced Quality Planning team in the timely and accurate completion of several projects.
May 1993- February 1996	Port Huron Molded Products, A Blue Water Plastics Co. ***Manufacturing Engineer*** Related duties: *Validated all new molds to the mold build standards. *Coordinated all tool repairs with outside vendors to ensure repairs were accurate and timely. *Conducted several Lean Manufacturing workshops with customer participation. *Managed several process technicians and initiated procedures for the communication of parameter changes, mold repairs, and Engineering changes to all departments. *Reduced internal PPM's through the implementation of a "Fix Six" methodology.
June 1991 -May 1993	Blue Water Plastics. Inc. -Marysville, Michigan ***Project Engineer*** *Developed prototype part designs through customer interface and communication. *Managed several programs through the production phase.

EDUCATION:

December 2004	M.S. Degree, Engineering Management *Western Michigan University – Grand Rapids, MI*
May 1991	B.S. Degree, Product Design Engineering Technology *Ferris State University – Big Rapids, MI*
May 1989	A.A.S. Degree, Technical Drafting and Tool Design *Ferris State University – Big Rapids, MI*

ON CAMPUS PDET

Student	Student No	Transf (T/F)	Start 311	Start Hrs	Grad (Y/N)	End 499	Grad Sem	Hr at Grad	LSOC	FSU AS	FSU BS	Code	Grad	Code	PGM HRS	Grad Sem	grad sem	time	Gender (1=M, 2=F)
		T	93	94	Y	95	W95	158	W95	R	PDET	89	1	82	64	W95	95	2.0	1
		T	93	72	Y	95	W95	142	W95	R	PDET	89	1	82	70	W95	95	2.0	1
		T	93	61	Y	95	W95	122	W95	R	PDET	89	1	82	61	W95	95	2.0	1
		T	93	87	Y	95	W95	146	W95	R	PDET	89	1	82	59	W95	95	2.0	1
		T	93	93	Y	95	W95	163	W95	R	PDET	89	1	82	70	W95	95	2.0	1
		F	93	73.35	Y	95	W95	142.35	W95	CDTD	PDET	89	1	67	69	W95	95	2.0	1
		F	93	94	Y	95	W95	136.35	W95	R	PDET	89	1	82	42.35	W95	95	2.0	1
		T	93	90.01	Y	95	W95	141.35	W95	R	PDET	89	1	82	51.34	W95	95	2.0	1
		T	93	73	Y	95	W95	141	W95	R	PDET	89	1	82	68	W95	95	2.0	1
		T	93	64	Y	95	W95	128	W95	R	PDET	89	1	82	64	W95	95	2.0	1
		T	93	154	Y	95	W95	207.37	W95	CDTD	PDET	89	1	67	53.37	W95	95	2.0	1
		F	93	68	Y	95	W95	130.01	W95	CDTD	PDET	89	1	67	62.01	W95	95	2.0	1
		F	93	66.03	Y	95	W95	125.03	W95	R	PDET	89	1	82	59	W95	95	2.0	1
		T	93	62	Y	95	W95	120.7	W95	R	PDET	89	1	82	58.7	W95	95	2.0	1
		T	93	79.43	Y	95	W95	143.43	W95	R	PDET	89	1	82	64	W95	95	2.0	1
		F	93	85.37	Y	95	W95	137.03	W95	MET	PDET	89	1	77	51.66	W95	95	2.0	1
		F	93	94.72	Y	95	W95	146.38	W95	MET	PDET	89	1	77	51.66	W95	95	2.0	1
		T	93	73	Y	95	W95	142	W95	R	PDET	89	1	82	69	W95	95	2.0	1
		T	93	73	Y	95	W95	136	W95	R	PDET	89	1	82	63	W95	95	2.0	1
		T	93	80	Y	95	W95	145	W95	R	PDET	89	1	82	65	W95	95	2.0	1
		F	93	72.7	Y	95	W95	134.7	W95	MET	PDET	89	1	77	62	W95	95	2.0	1
		F	93	69.69	Y	95	W95	128.69	W95	MET	PDET	89	1	77	59	W95	95	2.0	1
		T	93	76.52	Y	95	W95	152.52	S95	R	PDET	89	1	82	76	W95	95	2.0	1
		F	93	66.68	Y	95	W95	136.68	W95	CDTD	PDET	89	1	67	70	W95	95	2.0	1
		T	93	95	Y	95	W95	139	W95	R	PDET	89	1	82	44	W95	95	2.0	1
		T	93	101.68	Y	95	W95	154.35	W95	R	PDET	89	1	82	52.67	W95	95	2.0	1
		F	93	74.7	Y	95	W95	140.7	W95	MET	PDET	89	1	77	66	W95	95	2.0	1
		F	93	65.34	Y	95	S95	134.01	S95	CDTD	PDET	89	1	67	68.67	S95	95.1	2.1	1
		T	93	110.13	Y	95	W95	165.13	W95	R	PDET	89	1	82	55	W95	95	2.0	1
		T	94	117.68	Y	96	W96	160.01	W96	R	PDET	89	1	82	42.33	W96	96	2.0	1
		T	94	74.01	Y	96	W96	139.01	W96	CDTD	PDET	89	1	67	65	W96	96	2.0	1
		F	94	68	Y	96	W96	134	W96	CDTD	PDET	89	1	67	66	W96	96	2.0	1
		T	94	73.84	Y	96	W96	141.84	W96	R	PDET	89	1	82	68	W96	96	2.0	1
		F	94	68.67	Y	96	W96	136.67	W96	CDTD	PDET	89	1	67	68	W96	96	2.0	1
		F	94	74.01	Y	96	W96	139.01	W96	CDTD	PDET	89	1	67	65	W96	96	2.0	1
		T	94	74.02	Y	96	S96	132.02	F96	Tech ill	PDET	89	1	84	58	S96	96.1	2.1	1
		F	94	73.69	Y	W96	W96	141.35	S97	Tech ill	PDET	89	1	84	67.66	W96	96	2.0	1
		T	94	70.59	Y		S96	147.59	W96	R	PDET	89	1	82	77	S96	96.1	2.1	1
		T	94	66	Y	96	S96	129	S96	R	PDET	89	1	82	63	S96	96.1	2.1	1
		T	94	75	Y	96	W96	141	W96	R	PDET	89	1	82	66	W96	96	2.0	1
		T	94	110.71	Y	96	S96	151.7	S96	CDTD	PDET	89	1	67	40.99	S96	96.1	2.1	1

APPENDIX D

Program Analysis by MDSN Department Chairman

Program Analysis by MDSN Department Chairman

There is some obvious redundancy involved when the department chairman is the chairman of the program being evaluated and a major contributor to the content of the APR report. In an attempt to evaluate the program as objectively as possible, however, within the defined metrics of the APR process, this departmental evaluation is primarily focused on conclusions regarding the program that can be substantiated by data and statistical measures.

Relationship of the program to institutional goals. The career oriented focus of the Product Design Engineering Technology program is directly aligned with the stated mission of Ferris State University. In addition the program is well aligned with institutional goals regarding efficient use of faculty and facilities. Program credit hour costs are lower and program faculty productivity is higher than the averages of both the College of Technology and Ferris State University (see section 3). The program has an exceptional record of graduation rates (86.9%) and graduation efficiency (74.5% graduate in two years, 96.6% graduate within three years). The encouragement of transfer student enrollment, another frequently cited Ferris State institutional objective, is directly consistent with the Product Design program in that historically 46% of program students have transferred from another institution (see Section 3).

Visibility and distinctiveness. The Product Design Engineering Technology program is the only undergraduate BS degree program of its type in Michigan. Nationally there are few comparable programs except the BS in Product Design offered by Stanford University. The Stanford Product Design program and, more specifically its MS degree component, has been used to benchmark the Product Design Engineering Technology program at Ferris State. In addition to these aspects of external uniqueness, the Product Design program is unique among FSU programs in that it accepts transfer students from an exceptionally wide variety of backgrounds.

Visibility is a critical area of deficiency for the Product Design program. It is poorly advertised and promoted, relying primarily upon direct referral for new potential students. The unique nature of the program further complicates recruitment in that, other than cases of direct referral, potential students are have little knowledge or recognition as to the content, value and opportunities offered by the program.

Program value. The value attributed to the Product Design Engineering Technology program by Michigan employers is directly indicated by the starting salaries offered to program graduates. Data presented in this report indicates that 2004 graduates (the most recent available data), with an average starting salary of $51,699, is the 4th highest of all Ferris State Bachelors degree programs. PDET graduate salaries show a continuing positive trend that is indicative of a sustained need for program graduates over more than a ten year period (see Section 3). The value of the program to its graduates is best indicated by the alumni survey (see Section 2A) which established that 56% of responding program graduates were ‘very satisfied’ with their Product Design education.

Characteristics, quality and employability of students. As discussed previously, the findings of this report indicate that the admission procedures, program curriculum and graduation standards of the PDET program are such that an extremely high level of success in the program (graduation rate; 86.9%, see Section 3) is achieved and that graduating students have skills that are highly valued in the workplace upon graduation (see Starting Salary history, Section 3).

Quality of curriculum. The program curriculum is diverse in that it prepares graduates for a variety of careers in or associated with mechanical design (see Program Credit Hour Allocation, Section 3). The professional flexibility provided by the required course content is a valued aspect of the program (see Question 15 responses, Section 2A). The program curriculum is flexible and responsive, detecting and adapting to changes in university requirements as well as those of the industrial employers of its graduates. An example of this is the integration of solid modeling into the curriculum. Through its Advisory Board and other industrial contacts, the program faculty detected the need to include solid modeling in the program coursework (see Recommendation 1, September 2000 program review). The faculty then achieved the integration of this software into the program with little institutional support. This change has since proved to reduce cost and facility requirements for the university while increasing student satisfaction (see Section 3I).

Composition and quality of faculty. The Product Design faculty is well qualified both academically and professionally to support the program. Both faculty members have completed more than 60 semester hours of graduate level courses at other Michigan universities at their own expense since the last review. Both faculty also possess relevant graduate degrees in engineering from other Michigan universities. Promotions have been earned at the earliest opportunity since the last APR. Both faculty members have substantial professional qualifications (see Section 3H) prior to their career at Ferris State. The number of faculty members is appropriate for the current program enrollment and a significant amount of the teaching load for the program faculty is provided by teaching in non-PDET prefix classes and/or PDET prefix service classes that have been developed by the faculty. This reflects the a high level of professional versatility and flexibility among program faculty members.

Adequacy of facilities and equipment. The single classroom that is used for most Product Design classes is adequate for the current program enrollment. While the quality of the current facilities is acceptable, the program would greatly benefit from two recommended improvements. The primary need is to provide air conditioning / climate control in the programs primary classroom. Currently the PDET classroom is nearly intolerable for teaching / learning in August, September and occasionally in April. The second area recommended for facility improvement is to provide design studio space for senior students in the program. This recommendation is reasonable because acceptable space is believed to be available and the benefit provided to the students during their capstone design project would be substantial.

Summary Evaluation

The Product Design program efficiently produces graduates with skills highly valued in the workplace. To sustain the program however, immediate action must be taken to more effectively promote the program to attract more external transfer students and to reduce the recent decline in enrollment. By all measures presented in this report, the Product Design Engineering Technology program has been proven to be of exceptional value to Ferris State University and actions to enhance the program would prove to be a sound investment of institutional resources.

Submitted by,

Richard F. Goosen PE
Mechanical Design Department Chairman

APPENDIX E

Program Analysis by College of Technology Dean

MEMORANDUM

TO: Doug Haneline, Chair, Academic Program Review Council

FROM: Tom Oldfield, Dean, College of Technology

SUBJ: Analysis of Product Design Engineering Technology Program

DATE: August 14, 2006

Upon review of the Product Design Engineering (PDET) Self-Study document, I make the following observations:

1. The program provides a comprehensive education in mechanical design that prepares our graduates for the rigors of today's industrial demands. This is in keeping with the mission of Ferris State University.
2. The curriculum and structure blend engineering science with areas such as technical communication and the legal aspects of intellectual property. As such, this program is unique in the State. The design of the program and the efforts of the faculty make the program transfer friendly. For the past two years, the President has stressed the need for our programs to be transfer friendly.
3. There has been increased competition for both internal and external transfer students which has affected program enrollment. The College of Technology has recognized this issue and is currently developing marketing materials, both print and electronic, that will give the college a common "look." We will also continue to develop strategies to best utilize limited resources to enhance our recruiting efforts for PDET and the other programs offered by the college.
4. The program faculty have worked diligently to maintain a curriculum that is current, provides a meaningful learning experience for our students, and meets the needs of business and industry. The faculty are dedicated to the success of their students through intense advising which is demonstrated by 75% of the students graduating in two years and 96.6% of the students completing their studies within three years. The program also uses a significant number of courses outside the curriculum, 62%, which provides students with a broader learning environment.
5. PDET graduates have a high level of job placement and competitive salaries being the 6th highest average starting salary of all university programs according to the latest salary information.

In summary, I believe that the self-study is an accurate reflection of the Product Design Engineering Technology program and will work with the Vice President to attempt to address the recommendations.