PRODUCT DESIGN ENGINEERING TECHNOLOGY

BACHELOR OF SCIENCE PROGRAM

SELF STUDY

FOR

ACADEMIC PROGRAM REVIEW

Ferris State University
College of Engineering Technology
Mechanical Design Department

August 2013

Table of Contents

Section 1: Program Overview

A. PROGRAM GOALS:

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 and remain unchanged. Technology has and will continue to progress and alter the tools used in design. However the fundamental knowledge of mechanical design principles will still remain a critical link in the use of those tools and therefore retain the relevance of the goals set forth at the foundation of the program. In addition, program faculty continue to adhere to the mission of Ferris State University which is to be a national leader in providing opportunities for innovative teaching and learning in career oriented, technological and professional education.

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 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 extremely 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. Additionally, Wayne State University has a "Design Track" under its Mechanical Engineering Technology program and Grand Valley State University offers a "Product Design and Manufacturing Engineering" program. Both of these programs have minor content similarities but even those appear to be at a much less intense level. For example, some of the same course topics but where the Product Design Engineering Technology has individual courses, they merely cover the topic as one of many within a single course. Both institutions try to marry the Product Design aspects with other areas within the industry such as Manufacturing or Mechanical Engineering which once again reiterates the uniqueness and focus of the Product Design Engineering Technology program at Ferris State University.

The central problem area for the PDET program is its lack of visibility. Other than the students already enrolled in College of Engineering 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.

Industrial Designers – Normally a B.F.A. degree. Concerned primarily with product appearance and functionality.

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 grow 9% and 10%, respectfully, from 2010 to 2020. Further examination using these growth rates shows a predicted 21,300 and 4,300 new job openings by 2020. Annual salary on a national level for these categories for May 2010 is estimated to be;

SOC Code	BLS Title	Median Annual Salary
172141	Mechanical Engineers	$78,160
271021	Commercial & Industrial Designers	$58,230

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. For more suitable date, the National Association of Colleges and Employers' Spring 2012 Salary Survey found the average annual salary for BS Mechanical Engineering Graduates was $58,600. In addition to this information PayScale.com reports that the current average salary for BS Mechanical Engineering Graduates is $54,856. 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	2010	2020	% Change	Annual Openings
172141	Mechanical Engineers	30,910	33,930	+9.8%	1,297
271021	Commercial & Industrial Designers	4,830	5,250	+8.7%	192

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;

> *Mechanical engineers will also be involved in various manufacturing industries—specifically, transportation equipment and machinery manufacturing. They will be needed to design the next generation of vehicles and vehicle systems, such as hybrid-electric cars and clean diesel automobiles. Machinery will continue to be in demand as machines replace more expensive human labor in various industries. This phenomenon in turn should drive demand for mechanical engineers who design industrial machinery.*[1]

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 and again with the rapid prototype project in 2012. 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

[1] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2012-13 Edition*, Mechanical Engineers, on the Internet at **http://www.bls.gov/ooh/architecture-and-engineering/mechanical-engineers.htm** (visited *June 25, 2013*).

PDET 415	Advanced Solid Modeling	Fall 4th year
PDET 499	Senior Project / Capstone	Winter 4th year

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.

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 of the program with 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: Collection of Perceptions.

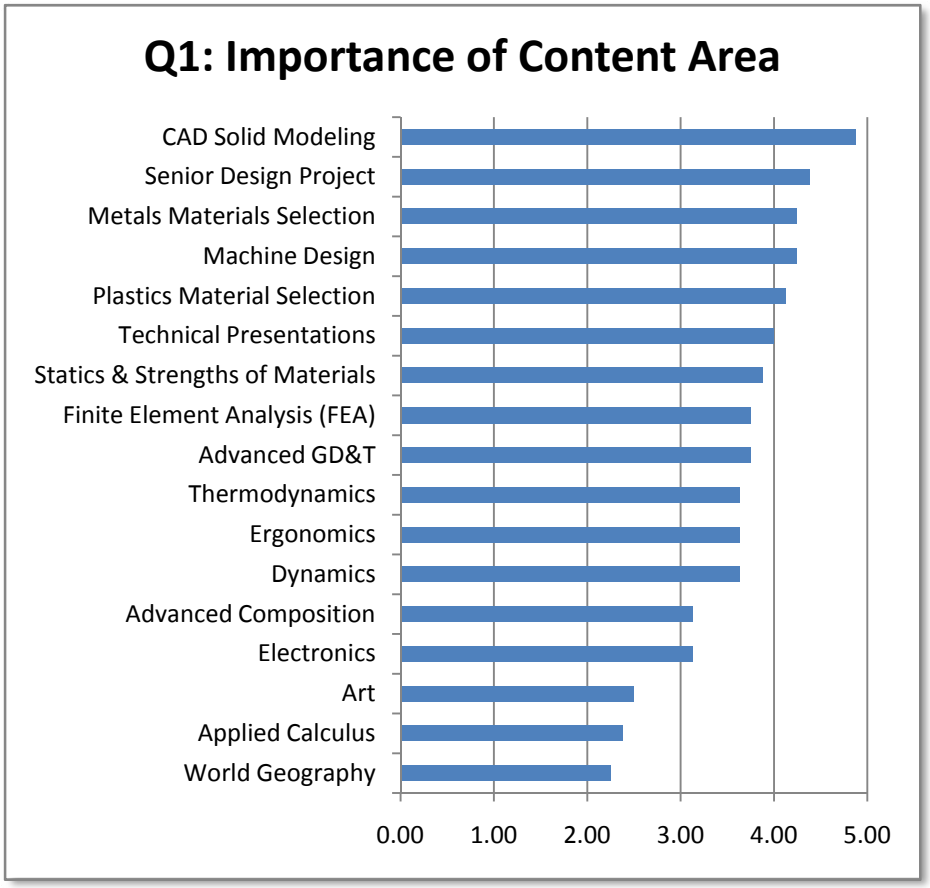
A. GRADUATE FOLLOW-UP SURVEY:

It should be noted that the data presented in this section is based on a data set of 8 respondents out of over 400 past graduates of the PDET program. Due to this statistical insignificance, the results of this survey will not be used to assess or change the program to any great degree. It can be seen by the data that two of the respondents were not very fond of the program, nor are they enjoying any significant success in the work place.

The small response rate has been traced to a communication error between the PDET faculty and the Institutional Research and Testing. Surveys were only sent to graduates since the last program review. Surveys were sent to 45 e-mail addresses which were uploaded from the alumni data base. 20 of them were rejected as invalid accounts. Therefore 25 surveys actually went out. 8 respondents from 25 is a 32% response rate which on the surface appears to be acceptable. But considering there are actually over 400 graduates from the program, 8 respondents represent an approximately 2% response rate.

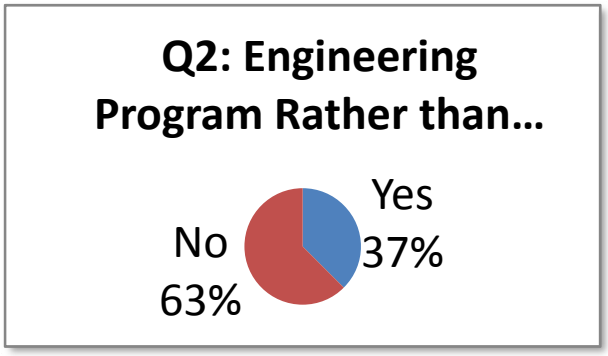
Below you will find the analysis for the data received for each question on the survey. The survey instrument can be found in Appendix D with the tabulated results from Institutional Research and testing found in Appendix E.

1. Based on your experiences since graduation, how important have the specific content areas of the Product Design academic program listed below been in your employment. (n=8)

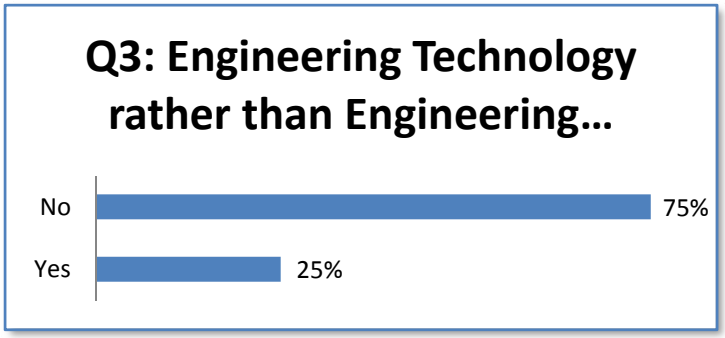


Analysis; The subject areas with the highest perceived value were Solid Modeling CAD (4.88) and the Senior Project (4.38). The subject areas with the lowest perceived value to program graduates were World Geography (2.25), Applied Calculus (2.38) and Art (2.50). This data is almost identical to the 2006 survey results.

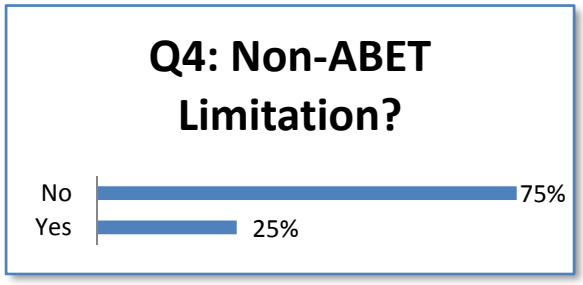
2. Should the PDET program become engineering rather than an engineering technology program? (n=8)



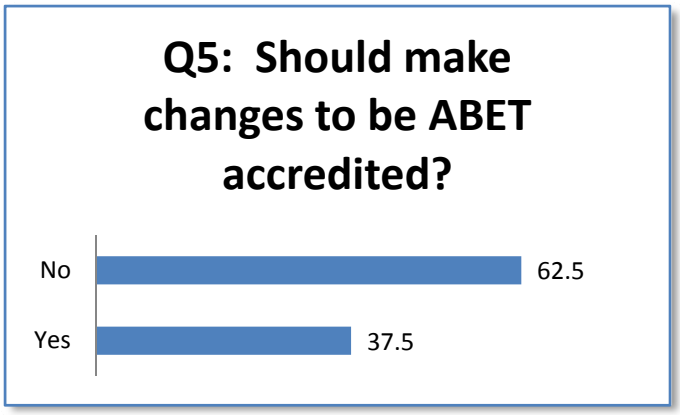
3. In your professional experience, has being a graduate of an engineering technology rather than an engineering program been a limitation in your career? (n=8)



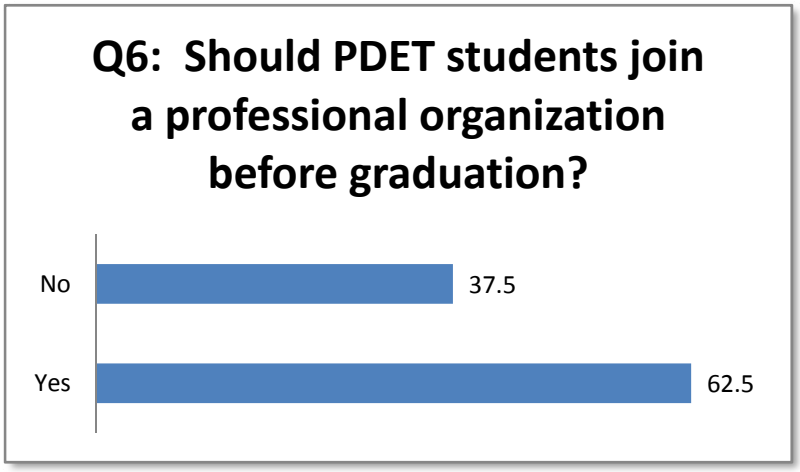
4. In your professional experience, has being a graduate of a non-ABET accredited engineering technology program been a limitation in your career? (n=8)



5. Should the PDET program make the necessary changes to become ABET accredited? (n=8)



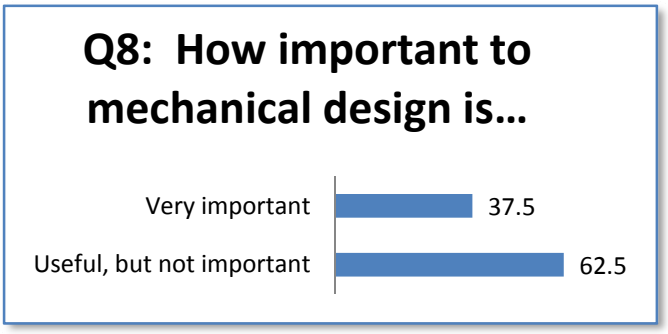
6. Based on your experience, would you recommend PDET students to join a professional organization before graduation? (Such as SAE, ASME, etc.) (n=8)



7. Which organization(s) would you recommend? (n=8)

- (Missing Info) (4)
- Any would be good, I think it depends on what field the individual will be going in to
- ASME
- SAE
- SPE, SME

8. How important to mechanical design is the ability to create renderings and sketches of products by free hand drawing? (n=8)



9. Name

- The names of the respondents have been withheld from this report

10. Company you currently work for:

- AAR mobility
- Andronaco Industries
- Broadview Product Development
- Hilite International
- Mid-America Machining
- North American Lighting, Inc.
- TLX Technologies
- Unemployed

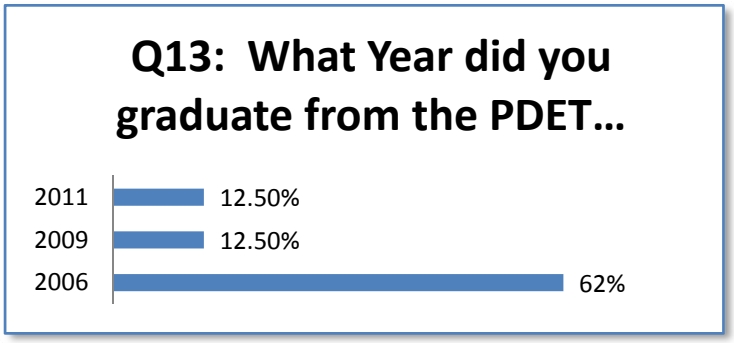
11. Title:

- Designer (2)
- Development Engineer
- Mold Designer I
- Product Design Engineer
- Product Design Engineer/Product Engineer
- Tooling Engineer
- Unemployed

12. City and state where you work (n=8)

- Brooklyn, MI
- Cadillac, MI
- Evansville, IN
- Grand Rapids, MI
- Kentwood, MI
- Pewaukee, WI
- Whitehall, MI
- Zeeland, MI

13. What year did you graduate from the Product Design program? (n=8)



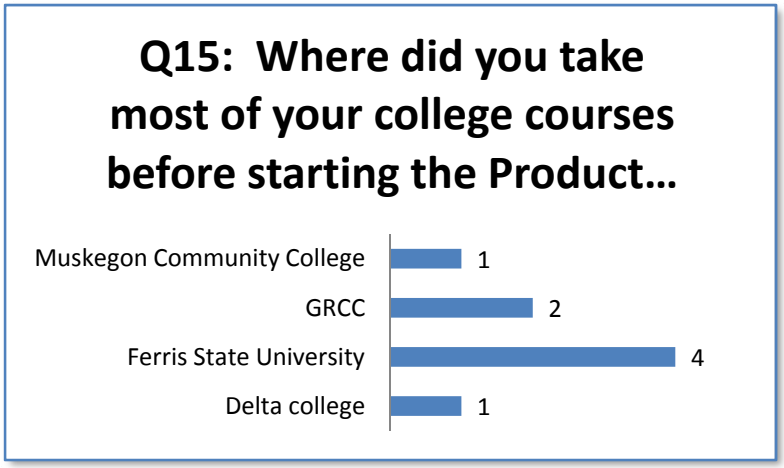
Analysis; Reponses indicated that only three class years were represented. Class year 2006 had the largest number (5) of respondents and class years 2009 and 2011 had the smallest number of respondents (1).

14. What was your area of study before starting the Product Design program? (n=8)

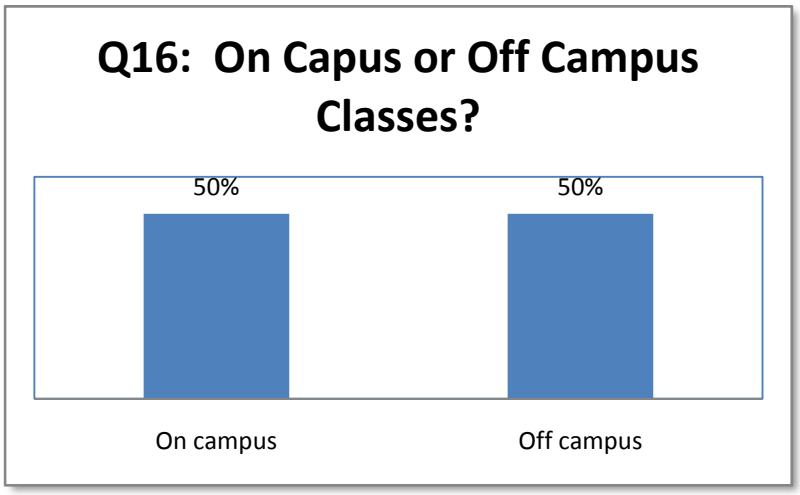
- Cad Designer
- CAD Drafting And Tool Design
- CAD Drafting/Tool Design
- CAD/Tool Design
- Machine Tooling Tech at Ferris
- Mechanical Drafting

- Mechanical engineering
- Plastics Technology and Mechanical drafting/design

15. Where did you take most of your college courses before starting the Product Design program? (n=8)

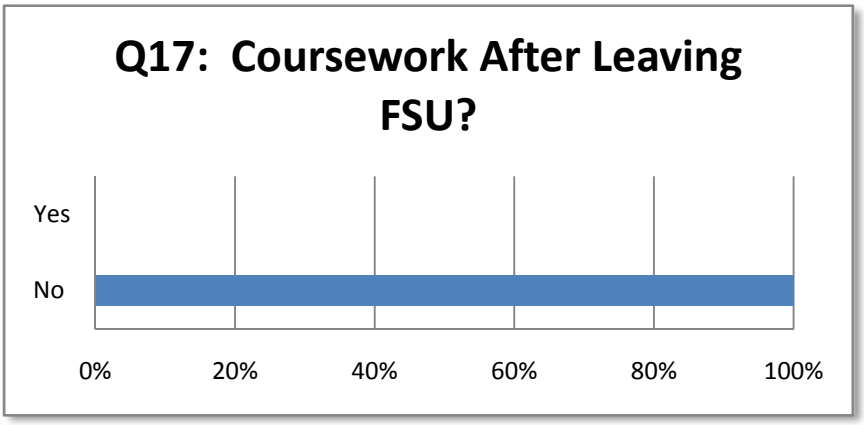


16. Did you take most of your PDET courses on campus or off campus? (n=8)



Analysis; of the (8) Responding students (50%) attended classes as on-campus students in Big Rapids.

17. Have you completed any college coursework since leaving FSU? (n=8)



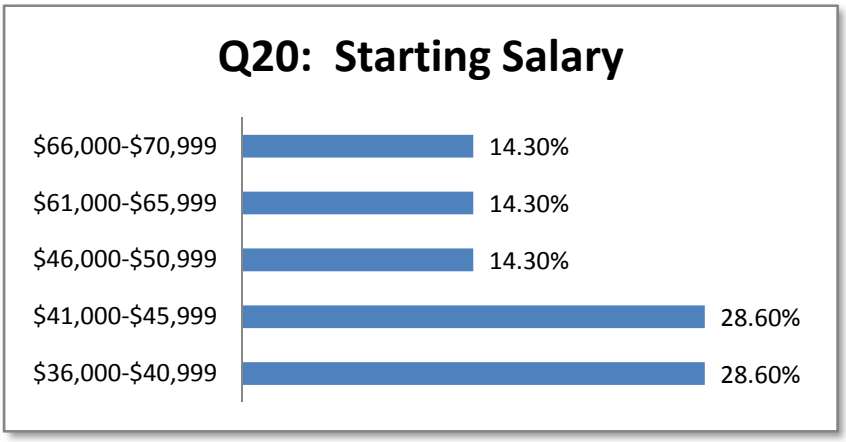
18. What was your area of study?

- **(Not Applicable)**

19. From which college or university did you take classes?

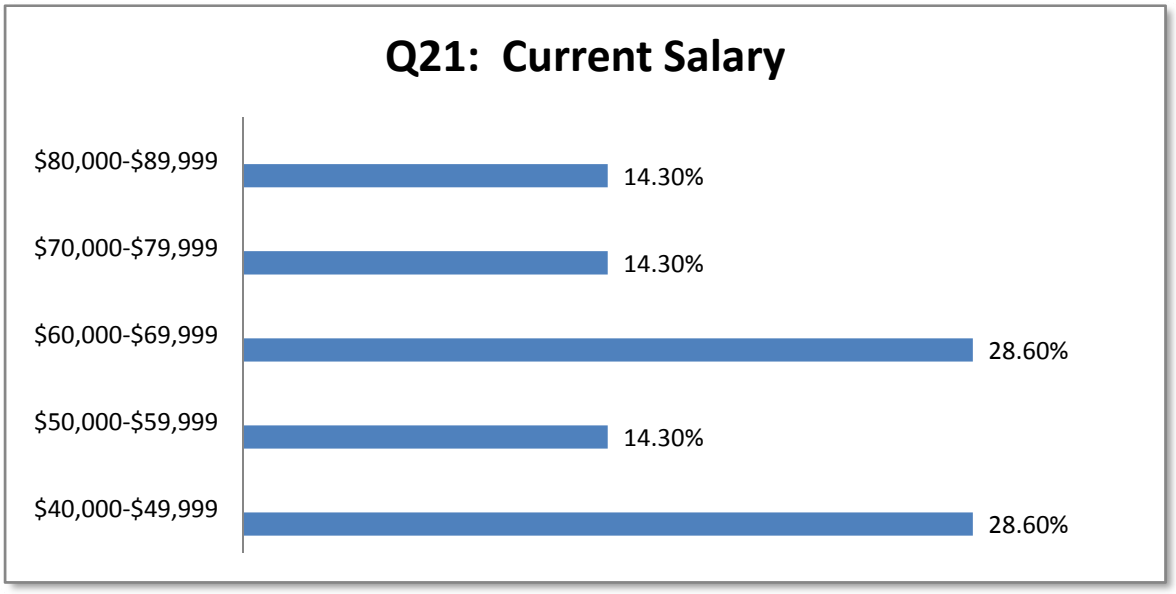
- **(Not Applicable)**

20. What was your starting annual salary after graduation? (n=7)



Analysis; Survey results indicate that (4) of the respondents were in the lower salary bracket, (3) were in the upper two thirds of the salary range and (1) was not reported. This split coincides with the on and off campus respondents being equally split. Student in the off-campus program are generally already working and therefore would command a greater salary.

21. What is your current annual salary? (n=7)

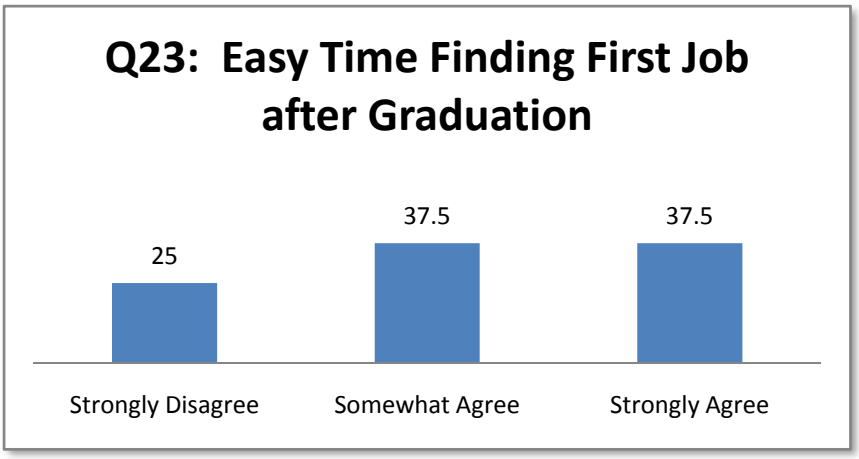


22. Which of the following best describes your current position? (Please select all that apply.)

- Design (7)
- Project/Product Management (4)
- Technical Management (1)
- Other
    - design and develop all new products, tooling and processes from concept to production
    - unemployed

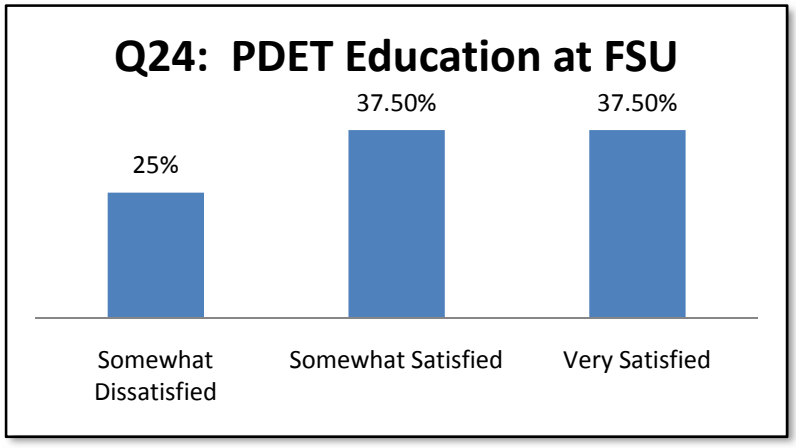
Analysis; Most responding program graduates are currently in a position associated with design (88%). Positions in Project/Product Management were reported by a lower number of respondents (50%). This indicates that most graduates are currently employed in positions related to their academic background in the Product Design program.

23. To what degree do you agree with the statement "I had an easy time finding my first job after Graduation"? (n=8)



Analysis; The survey results indicated that 3 responding graduates (37.5%) had little difficulty in finding employment after graduation. This can be compared with 2 of the responding program graduates (25%) that indicated a high level of difficulty in finding employment after graduation. Overall the response to this question indicates that most graduates (75% vs 25%) experienced little perceived difficulty in obtaining employment after completing their Product Design degree program.

24. Overall, how satisfied are you with the PDET education you received at FSU? (n=8)



Analysis; the survey results for this question have exactly the same distribution as the previous question regarding the ability to find a first job. It is clear that the ability to get employment is what the respondents feel is an important indicator of program satisfaction.

25. What was the most valuable aspect of the PDET program? This may be a specific course or courses or a general aspect of the program.

- All engineering classes
- All of the engineering courses being taught in an applied fashion rather than the theoretical. It lends a greater mechanical understanding.
- GD&T, Solid Modeling, FEA, Statics and strength of materials, Plastics, Material Selection, Professional presentations, and the Senior project is exactly what I am doing with my current job.
- I particularly enjoyed the "hands-on" aspect of the core instruction/classwork.
- Pro engineer
- The course as a whole gives you a great foundation to start your career on no matter what field you may find yourself in after graduation. From design, to lower level management, every course gives you a terrific understanding of any number of situations that you may find yourself in once you have been employed in some type of engineering position.
- The machine design classes and material selection classes have been the most valuable to me. One of the things that sets an engineering technology course apart is the broader background and overview of manufacturing. I think this is missed in most accredited programs because of all the math requirements. I think this is something that sets the Product Design program apart and should not be lost. Fancy math calculations are no good if I can't get the part out of a mold or the tooling cost is way to expensive.

26. What was the least valuable aspect of the PDET program?

- Applied Calculus
- Art
- Basic Art was a complete waste of time, as was COMM 336 (Tech. Presentations). A course on how to use MS powerpoint would have been more useful.
- Geography, ART, history,
- I can't really say, every core class of the curriculum was beneficial.
- If there is any way to drop unrelated requirements like social awareness or cultural enrichment classes and pick up more manufacturing and electronics classes it would help, but I am not sure this is something the school would let you do.
- Psyc. classes

27. Please use this space to provide any additional program changes you would recommend or general comments you wish to make.

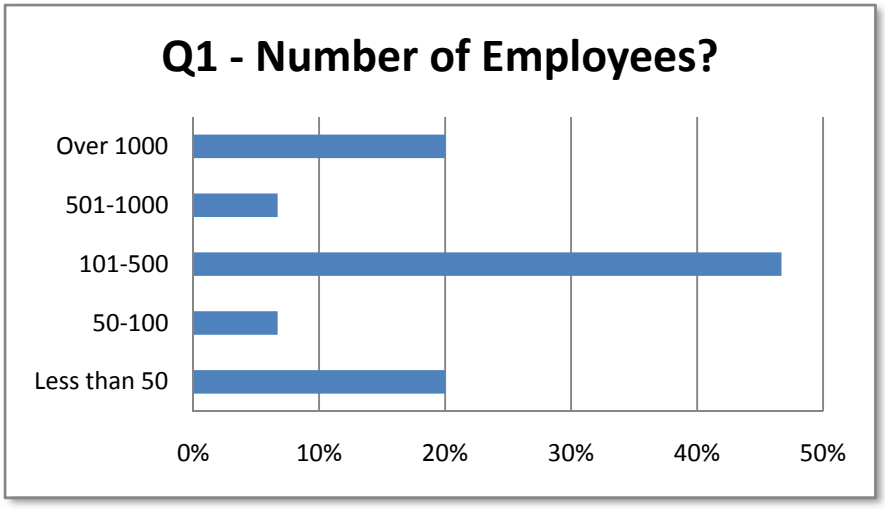
- During the GD&T courses focus more on every Geometric tolerance more than just position and perpendicularity, which are closely related anyway. I use cylindricity, total run out and profile of a surface alot at my job. Other than that all other courses have helped me in my career thus far.
- I think that it would be beneficial to offer internships for PDET students like the ones that are available to most of the other engineering technology programs at FSU.
- I think there are advantages to having an ABET accredited program but I think it is beneficial to have a more hands on program that is less theory as well. I would leave the product design program the way it is and let the Mech Eng prog carry any accreditation. I think there is an advantage to having both at the same university, it gives students a broader range of options. I would be interested in helping review the senior projects again as well. Please contact me at adamm@broadviewproduct.com if you need any extra people.
- More real life/lab work.
- Questions 20 & 23 are kind of skewed due to the fact that I was already working full time in engineering at the time I was taking classes and graduated. However I am thankful for the education I got from FSU. A few years after graduating the company I worked at for 20 years closed their doors. If it wasn't for my degree at FSU I wouldn't be as employable as I am today. Thank you FSU!
- Very proud to say that I studied PDET at Ferris State. Though not too many people have heard of the university or the program, my supervisors tell me all the time how impressed they are with the abilities that I have at such a young age, I have the PDET courses and professors to thank for that.

B. EMPLOYER FOLLOW-UP SURVEY:

Product Design Engineering Technology Employer/Industrial Survey

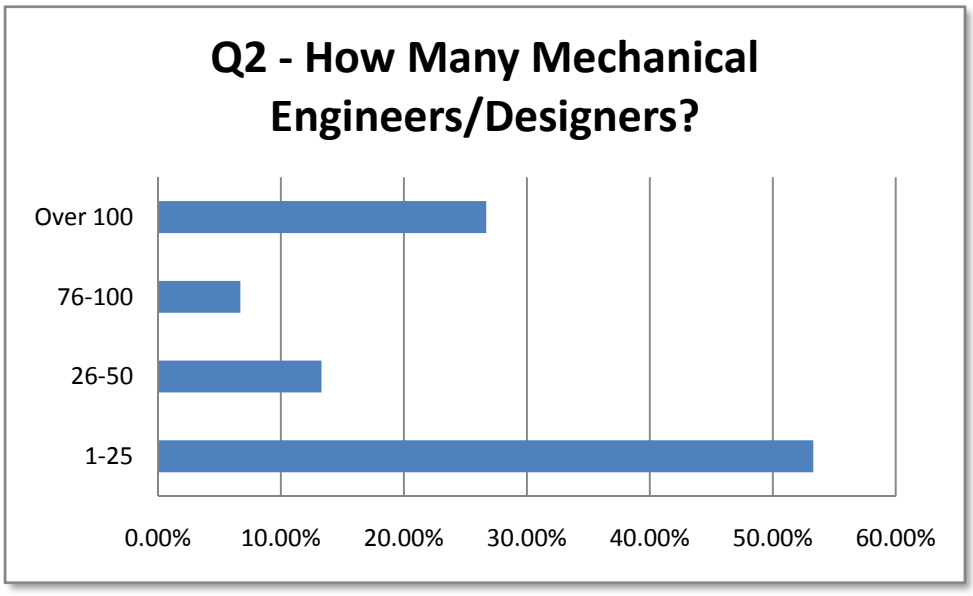
To assess the characteristics and needs of the work environment experienced by Product Design program graduates, a survey instrument was developed to evaluate targeted areas. The survey instrument, titled *Product Design Engineering Employer/Industrial Survey,* is provided in Appendix D. The survey was developed by FSU Institutional Research and Testing (IRT) in conjunction with program faculty. This survey was sent to employers via e-mail in electronic form. Fifteen (15) surveys were sent to different companies that have had some dealings with the PDET program in the past. Each recipient was asked to complete the survey or present the survey to someone at their current employer who was in a position to evaluate the effectiveness of mechanical design within the organization. The survey frequencies as tabulated by IRT can be found in Appendix E.

1. Approximately how many employees work at this facility?



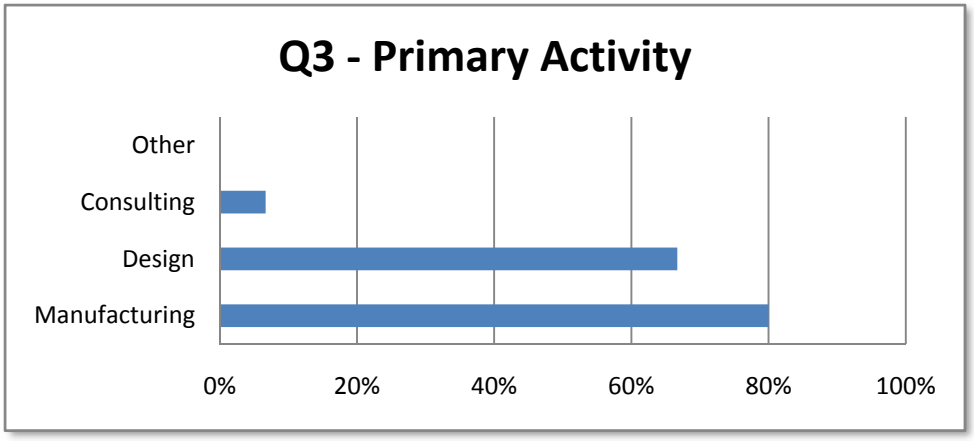
Analysis; Reponses indicated that most employers surveyed (46.7%) had between 100 and 500 employees.

2. Approximately how many mechanical engineers/designers work at this facility?



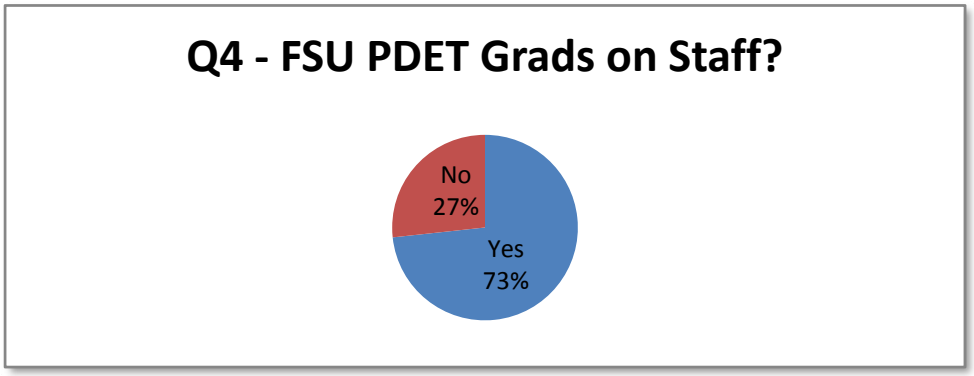
Analysis; Reponses indicated that most employers surveyed (53.3%) had between 1 and 25 mechanical engineers / designers working at their facility.

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



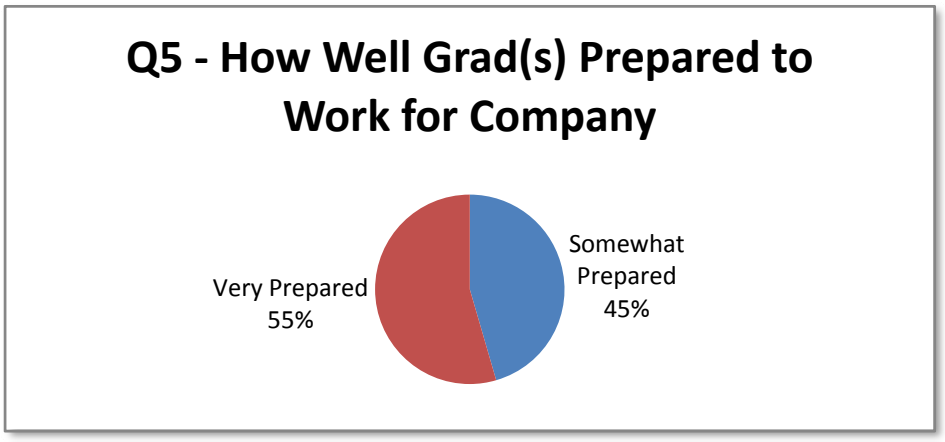
Analysis; Reponses indicated that most employers surveyed (12 employers, 80%) were primarily involved in manufacturing. A lesser number (10 employers, 66.7%) were primarily involved in design.

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



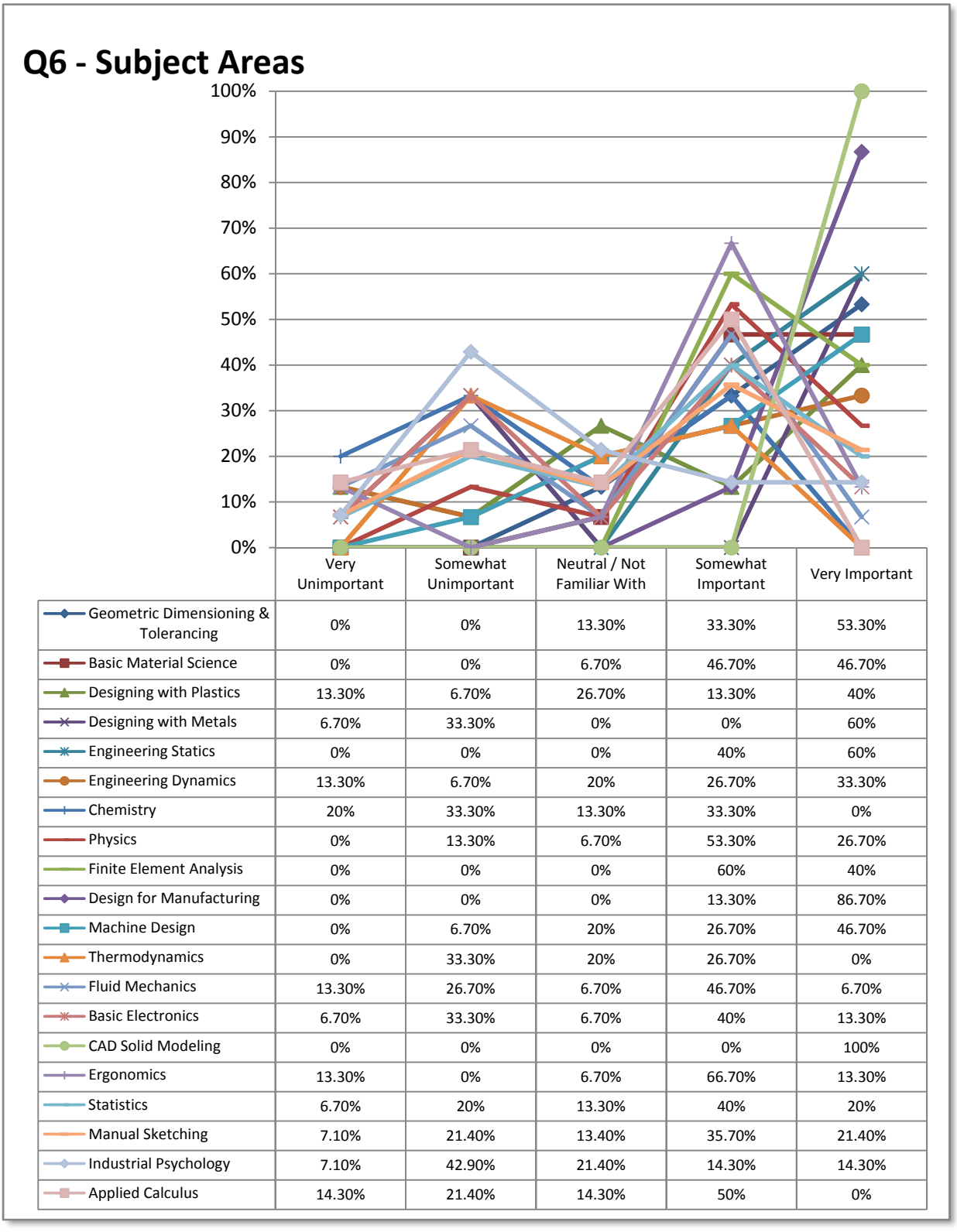
Analysis; Reponses indicated a relatively large number of respondents with a PDET program graduate as those that did not have a program graduate on staff. This is a good indicator that companies like the students coming from the PDET program.

5. How well do you feel that the FSU graduate(s) was/were prepared to work for your company?



Analysis; Reponses indicated that all employers having a PDET program graduate on staff (100%), thought that PDET program graduates were Very Prepared or Somewhat Prepared to work for their company. This speaks well for the curriculum being taught. Students are getting the skills necessary to be successful in the workplace.

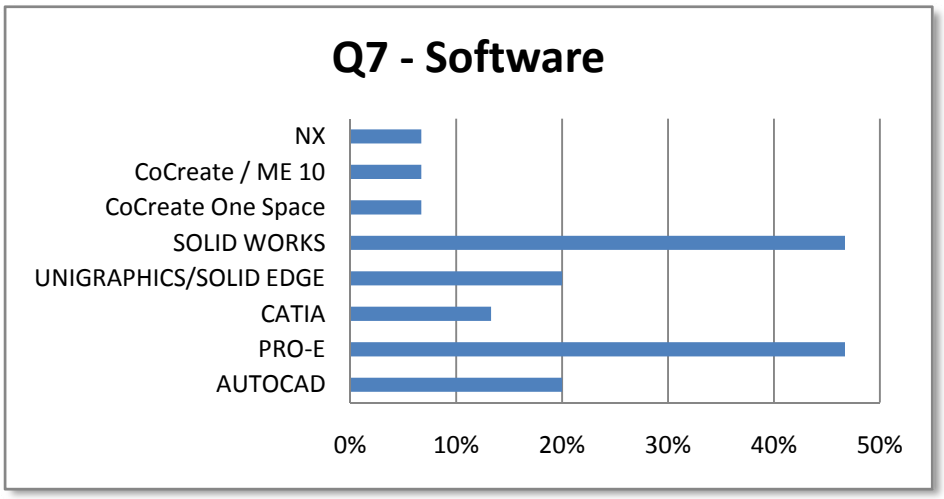
6. The following are the major subject areas in Ferris State University's Product Design Engineering program. Please indicate the relative importance you feel that this subject/skill would have if you were seeking to hire a recent graduate for your technical staff.



	Very Unimportant	Somewhat Unimportant	Neutral / Not Familiar With	Somewhat Important	Very Important
Geometric Dimensioning & Tolerancing	0%	0%	13.30%	33.30%	53.30%
Basic Material Science	0%	0%	6.70%	46.70%	46.70%
Designing with Plastics	13.30%	6.70%	26.70%	13.30%	40%
Designing with Metals	6.70%	33.30%	0%	0%	60%
Engineering Statics	0%	0%	0%	40%	60%
Engineering Dynamics	13.30%	6.70%	20%	26.70%	33.30%
Chemistry	20%	33.30%	13.30%	33.30%	0%
Physics	0%	13.30%	6.70%	53.30%	26.70%
Finite Element Analysis	0%	0%	0%	60%	40%
Design for Manufacturing	0%	0%	0%	13.30%	86.70%
Machine Design	0%	6.70%	20%	26.70%	46.70%
Thermodynamics	0%	33.30%	20%	26.70%	0%
Fluid Mechanics	13.30%	26.70%	6.70%	46.70%	6.70%
Basic Electronics	6.70%	33.30%	6.70%	40%	13.30%
CAD Solid Modeling	0%	0%	0%	0%	100%
Ergonomics	13.30%	0%	6.70%	66.70%	13.30%
Statistics	6.70%	20%	13.30%	40%	20%
Manual Sketching	7.10%	21.40%	13.40%	35.70%	21.40%
Industrial Psychology	7.10%	42.90%	21.40%	14.30%	14.30%
Applied Calculus	14.30%	21.40%	14.30%	50%	0%

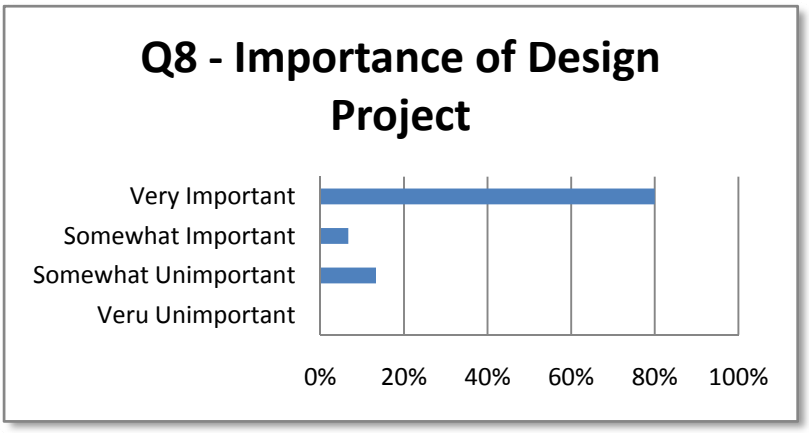
Analysis; The subject areas with the highest perceived value were Geometric Dimensioning & Tolerancing (GDT), Three Dimensional, Solid Modeling CAD (CAD3d) and Design for Manufacturing (DesManf). The subject area with the lowest perceived value to the employers surveyed was Industrial Psychology.

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



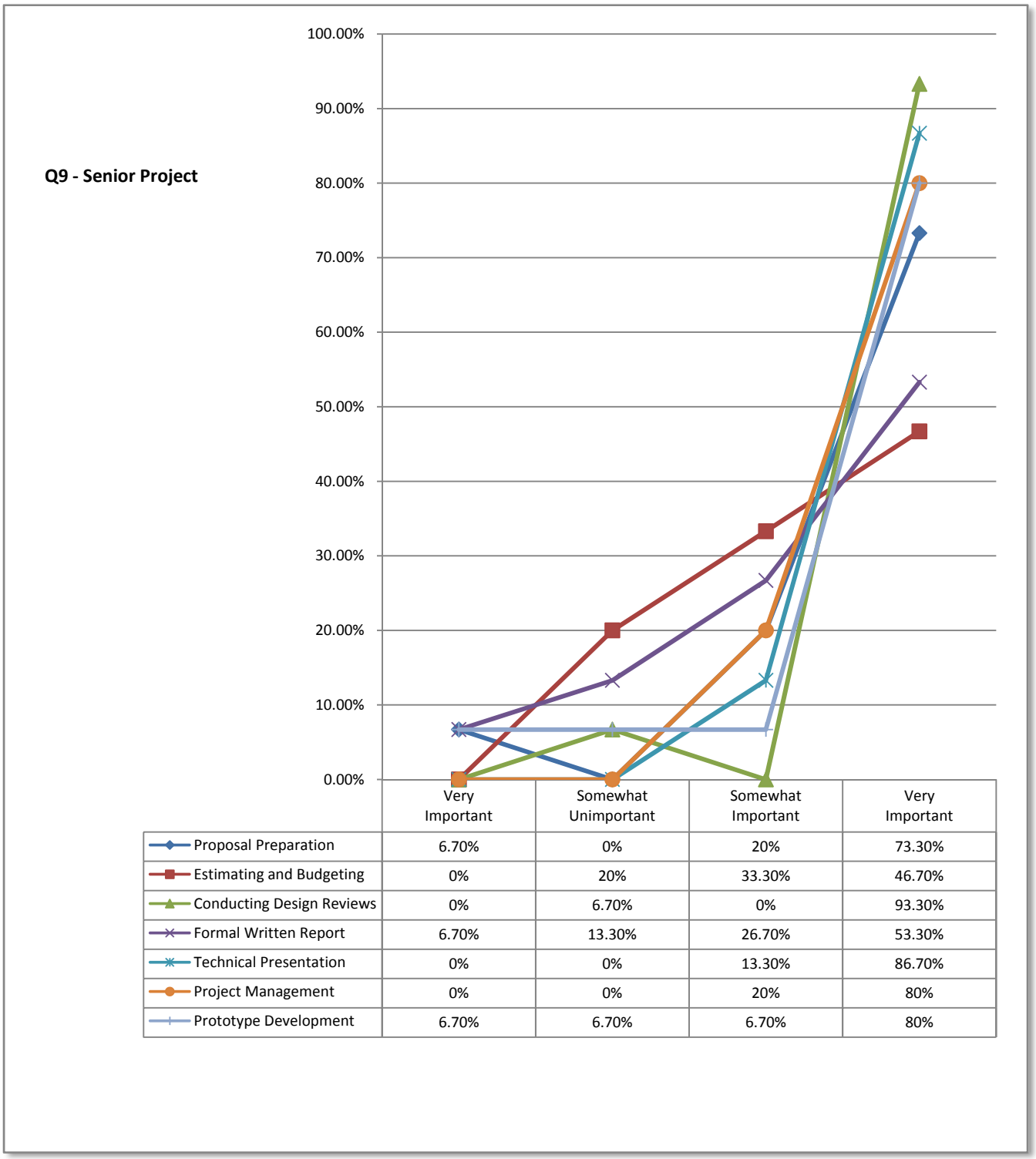
Analysis; The response to this question indicated no significant change in the CAD software used by those employers who typically hire PDET graduates. All instruction within the program is based on ProEngineer software. The expansion in the use of Solid Works software is notable and will be monitored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

8. Overall, how important do you feel the design project is?



Analysis; The response to this question indicates that 80% of typical PDET graduate employers consider the Senior Project activity to be a 'Very Important' activity.

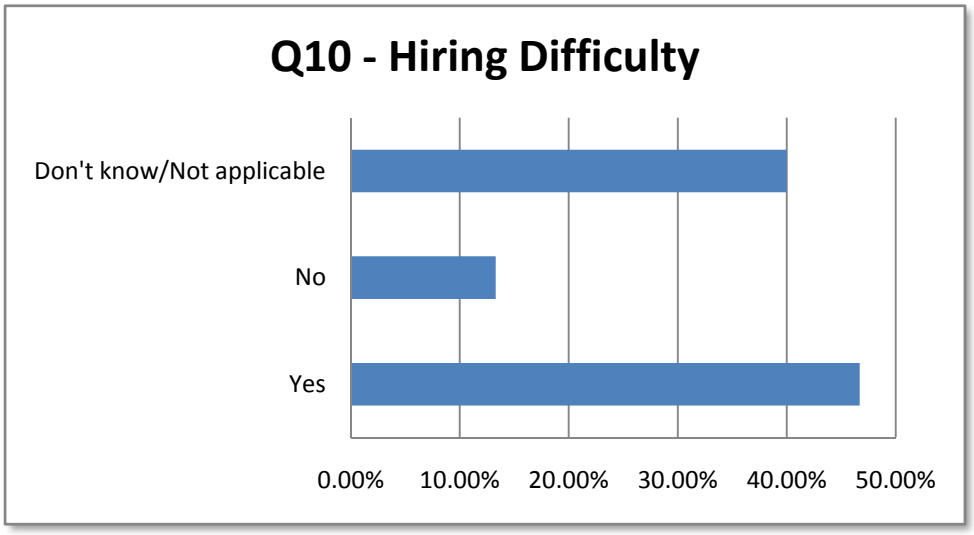
9. In addition to mechanical design and documentation, each senior project is intended to develop the following skills. Please rate the importance you would place on each skill.



	Very Important	Somewhat Unimportant	Somewhat Important	Very Important
Proposal Preparation	6.70%	0%	20%	73.30%
Estimating and Budgeting	0%	20%	33.30%	46.70%
Conducting Design Reviews	0%	6.70%	0%	93.30%
Formal Written Report	6.70%	13.30%	26.70%	53.30%
Technical Presentation	0%	0%	13.30%	86.70%
Project Management	0%	0%	20%	80%
Prototype Development	6.70%	6.70%	6.70%	80%

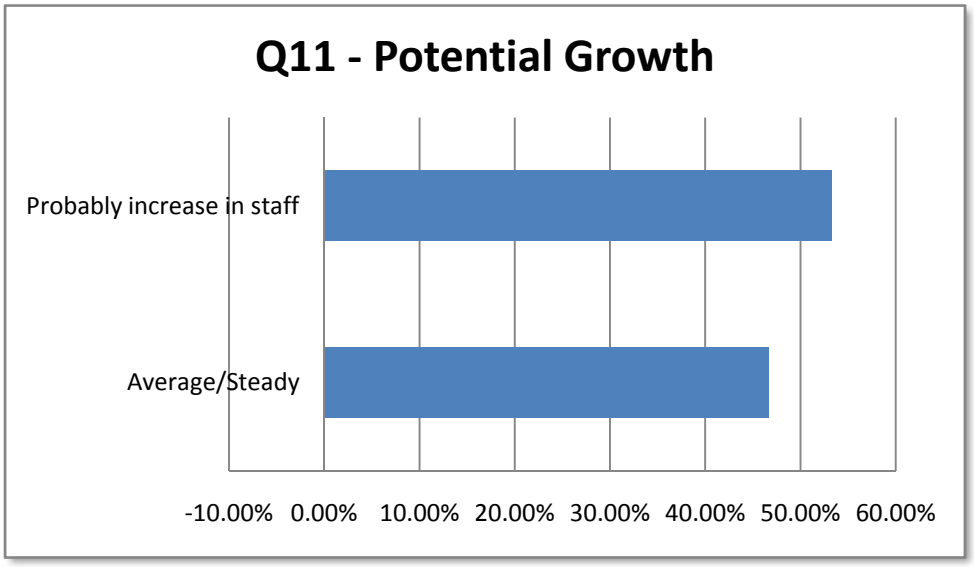
Analysis; The response to this question indicates that all identified elements of the PDET capstone project are considered important by potential PDET employers with all elements evaluated between 'Somewhat Important' and 'Very Important'.

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



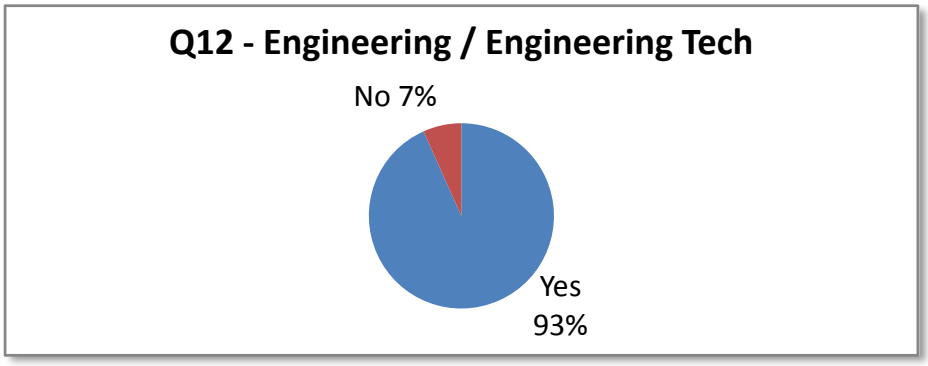
Analysis; The response to this question indicates that most potential employers of PDET graduates have had some difficulty in hiring new employees in this skill area during the last year.

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



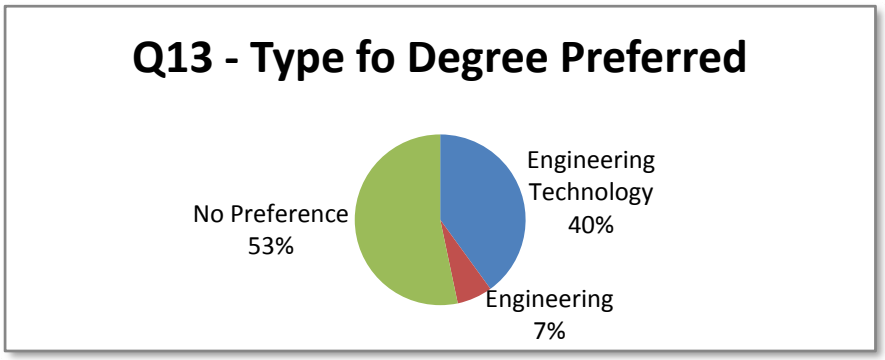
Analysis; The responses to this question indicates some change is predicted in staffing levels by potential employers during the next year. This is supported by the results of question 10. It is also evidenced by the fact that many of the PDET students graduating in May 2013 had received multiple offers for employment.

12. Are you familiar with the differences between Engineering and Engineering Technology BS degree programs?



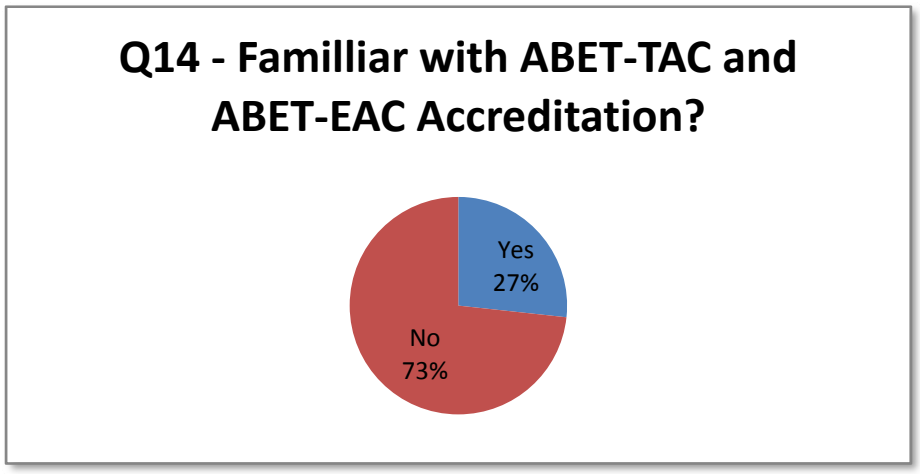
Analysis; The responses to this question indicate that the vast majority of potential PDET employers thought they were familiar with the differences between engineering and engineering technology academic programs. This is a good indicator that employers know what type of students they are looking for and that they can find them in the PDET program.

13. When hiring a new graduate for a mechanical design position, which type of degree do you prefer?



Analysis; Although over half (53%) 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 technology program graduate (40% vs. 7%).

14. Are you familiar with ABET-TAC and ABET-EAC accreditation?



Analysis; The response to this question indicates that 73% of potential employers are not aware of engineering and engineering technology accreditation standards.

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

- I graduated from PDET in 1996 & ended up working more as an engineer than a DE so my perspective is a little different than most. I wish I would've had more statistics education right out of that program. I also wish we were forced to work in teams more w/ assigned project & project leaders to really push the project mgmt skills. The kids always seem to hate working in groups but those interpersonal relationships we build while working in teams are crucial to being successful on any project. Even if you are not a project leader in your job, just figuring out how to manage your own time as a DE is very important when you have multiple concurrent jobs. For today's curriculum you might consider adding a Design for Six Sigma course even if it is only half a semester & the other half statistics. Our industry is using this tool more & more each year. We at GM are all required to have at least a Black Belt, everyone from DE's to executives. Design for failure mode effects analysis & Process failure mode & effects analysis (DFMEA & PFMEA) are also being pushed harder these days. I also want to mention that GM is now taking the stance that people w/ ET degrees will no longer be eligible for higher level (but not yet mgmt/people leader) pay grades. Pay grade 8 is a people leader, there are two bands within the pay grade 7. The higher 7 pay grades & up are no longer being given to ET degree holders. GM is doing this; Ford told me the same thing back in 2000. I'm not suggesting you change anything of course just a data point for your survey.

- One thing with the capstone project presentations is in my opinion there is to much emphasis in the presentations on costing the product. I would like to see more focus on the design and validation of the product. From a standpoint of cost in the presentation, it should only be a minute or two at most in the presentation, as most of them are just estimates from either someone the student knows or one of the professors, which in my mind is not of high value.
- Please contact me with graduates as we are looking for 3 candidates immediately. Sincerely Brodie Delemeester Engineering & Inside sales Manager Incoe Brodie.Delemeester@incoe.com
- The work ethic of the Ferris graduates has been the key contributor to their success here. Beyond any specific knowledge, a willingness to learn and a dedication to completing timely, quality work is the most important quality when hiring.

C. GRADUATING STUDENT EXIT SURVEY:

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 graduating PDET students for each year since the last program review and using the combined results for the analysis of sections 2C and 2D. The results presented in this section are based on the survey responses for all on-campus students graduating from Spring 2007 through Spring 2013. Similar surveys of perceptions were also conducted for students graduating from the off-campus program in Grand Rapids in Spring 2009 and Spring 2012. These off-campus student perceptions were evaluated and found to be similar to those of the off campus students and were not included in the statistical analysis. The comments and recommendations of the off-campus students are however included and separately identified with those of the on-campus students in this section.

Survey Instruments and Protocol

The surveys providing the content for this section were completed on the last class meeting of the capstone project class at the end of spring semester in 2007, 2008, 2009, 2010, 2011, 2012 and 2013. All students completing this course were required to complete the survey although students were free to provide any level of response they felt appropriate. A total of 100 surveys collected from the seven years identified were used for this report and the responses from these surveys provide some opportunity for longitudinal analysis. The fundamental content of the survey instrument is based on a survey instrument developed for prior program evaluations. The survey instrument for the years 2007, 2008 and 2009 were identical in content (see Appendix B for 2008 survey). Beginning with the 2010 survey (Appendix B) students were asked to identify in greater detail their college background before entering the program and to describe their general experience in seeking employment. Beginning with the 2012 survey (see Appendix B), a question relating to the choice of 3D modeling software used by the program was eliminated since the results were consistently supportive of the software

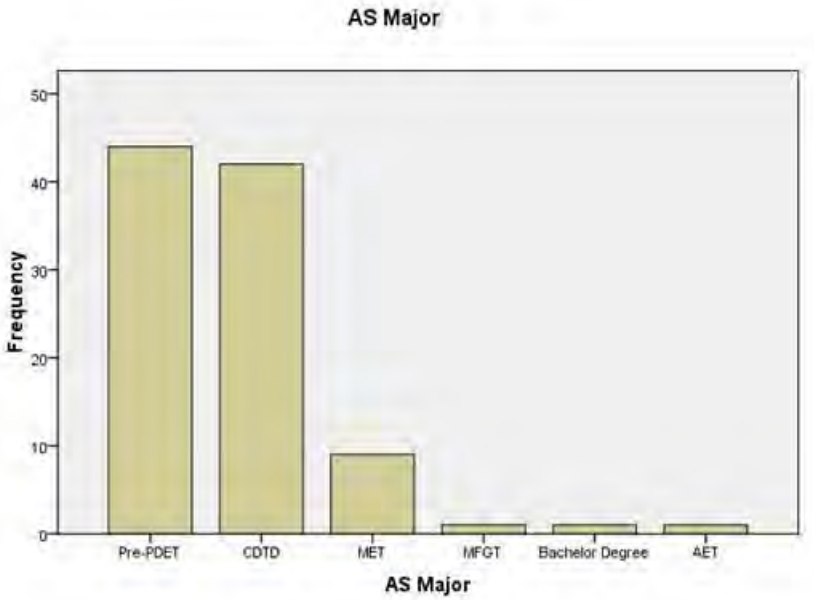
used and it was thought by the program faculty that a more valid response could be obtained from program graduates once they had professional experience. In 2013 (see Appendix B) a question regarding laptop computer use was eliminated since the results were overwhelmingly in favor of the program's laptop PC requirement. Also in 2013 students with at least one acceptable offer of employment were asked to identify their annual starting salary after graduation. Two additional questions were added to the 2013 student survey in which students were asked to provide an opinion regarding the creation of a 0 to 4 BS Product Design Engineering Technology degree program and if such a program should include an AS degree awarded to students completing the first two years. Copies of the survey instruments used for each year are included in Appendix B.

Survey Results and Analysis

PDET Student Background Questions. The initial questions on the surveys from all years were designed to determine the background of students entering the PDET program. Students were asked to indicate where they earned their associates degree and their program of study prior to starting the PDET program.

Prior College

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	FSU	61	61.0	62.2	62.2
	Other/Unspecified	13	13.0	13.3	75.5
	GRCC	4	4.0	4.1	79.6
	LCC	4	4.0	4.1	83.7
	MottCC	3	3.0	3.1	86.7
	KCC	3	3.0	3.1	89.8
	MuskCC	2	2.0	2.0	91.8
	WestSCC	1	1.0	1.0	92.9
	MontcalmCC	1	1.0	1.0	93.9
	BayDNCC	1	1.0	1.0	94.9
	NMCC	1	1.0	1.0	95.9
	Other 4 yr	1	1.0	1.0	96.9
	ITT	1	1.0	1.0	98.0
	WastCC	1	1.0	1.0	99.0
	AlpenaCC	1	1.0	1.0	100.0
	Total	98	98.0	100.0	
Missing	System	2	2.0		
Total		100	100.0		



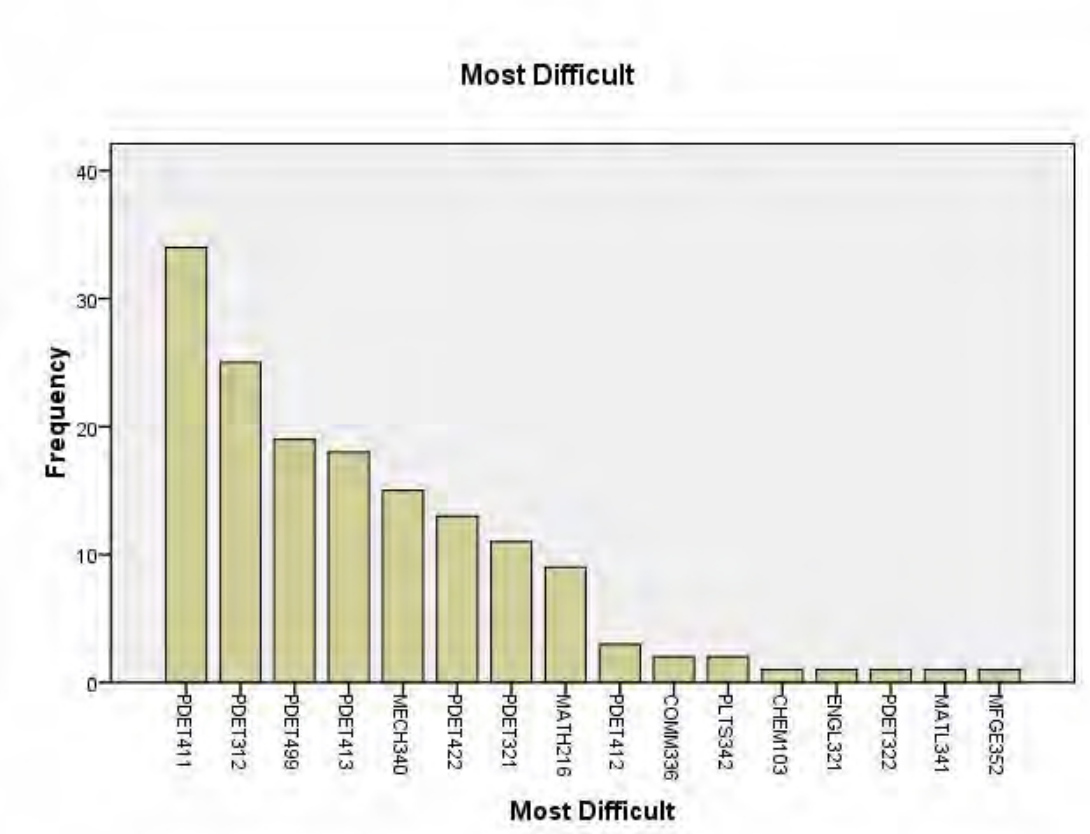
Analysis; The response to this question indicates that students enter the PDET program primarily from FSU programs as opposed to transferring from a different school (62% vs 39%). The data shows that the students that transfer into the program from other schools represent a wide variety of backgrounds including 11 different Michigan Community Colleges. It should be noted that the unspecified category was created by information from the 2007 through 2009 surveys which did not ask transfer students to identify specifically which school that they attended before starting the PDET program at Ferris.

The survey also shows that most students enter the PDET program from backgrounds other than the FSU CDTD program (42% from the FSU CDTD program vs 58% from other academic backgrounds). The largest single group (44%) were students from other programs loosely described as pre-PDET. This is a significant change since historically CDTD students have made up a larger percentage of PDET students than this result indicates and the current trend shows a decreasing number of CDTD students entering the program. This is thought to be due to decreasing numbers of CDTD program graduates and to a larger number of those graduates choosing to enter either the Manufacturing or Plastics programs. These results suggest that the best sources for future PDET enrollment could be from outside FSU and, to an increasing level, from academic programs not traditionally associated with Computer Aided Drafting (CAD).

PDET Program Course Evaluations Questions. These questions on the surveys from all years were designed to determine student perceptions regarding the individual required courses in the PDET program. Graduating students were asked to evaluate all required courses to identify the most difficult, most enjoyable, relative level of perceived learning, the best courses and the worst courses. Students were allowed to make multiple selections for each question resulting in more responses than responding students. A

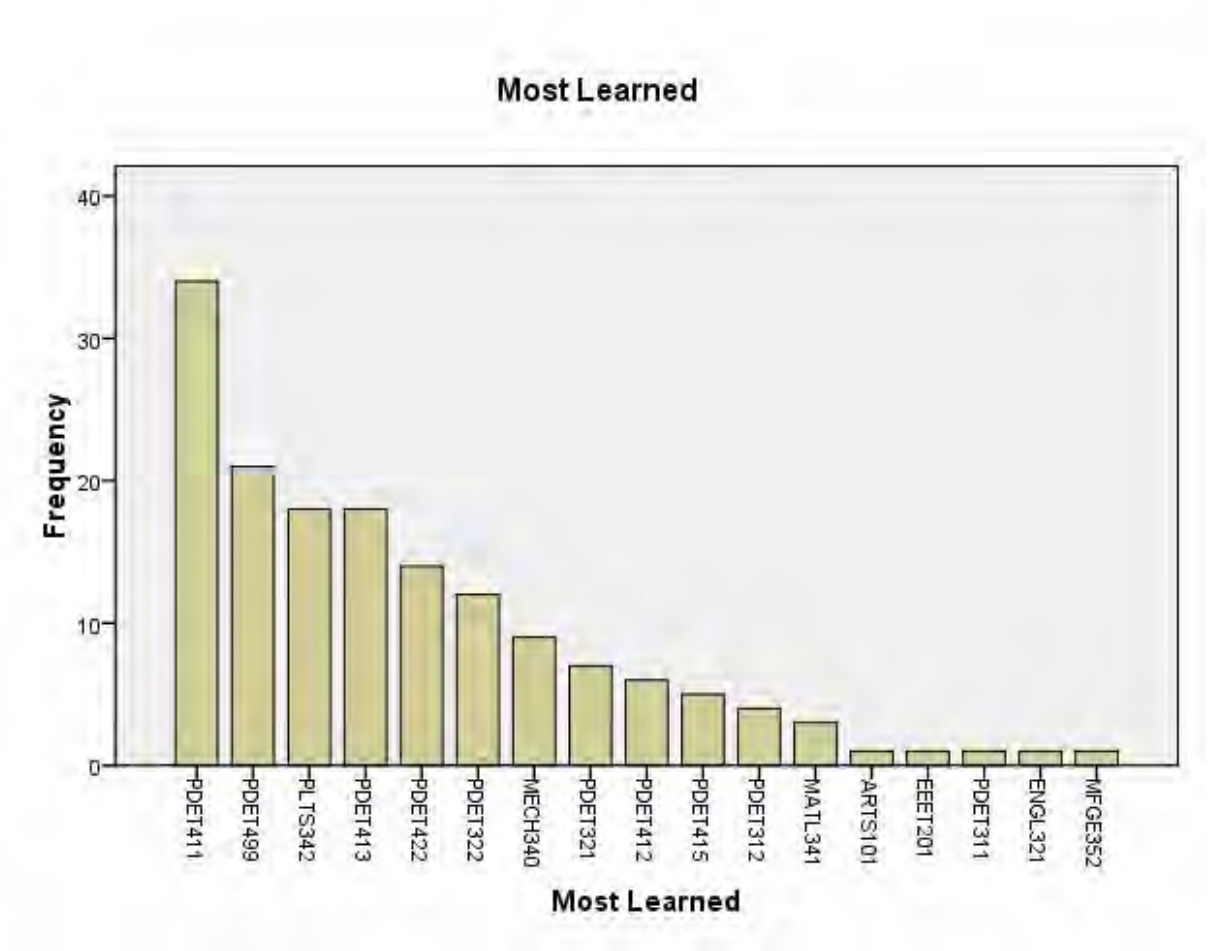
number of student surveys indicated a positive reaction to all program courses (PDET prefix courses). This response was not included in the data presented.

Most Difficult Course. This question asked the student to indicate which course(s) in the PDET curriculum that they found most difficult.



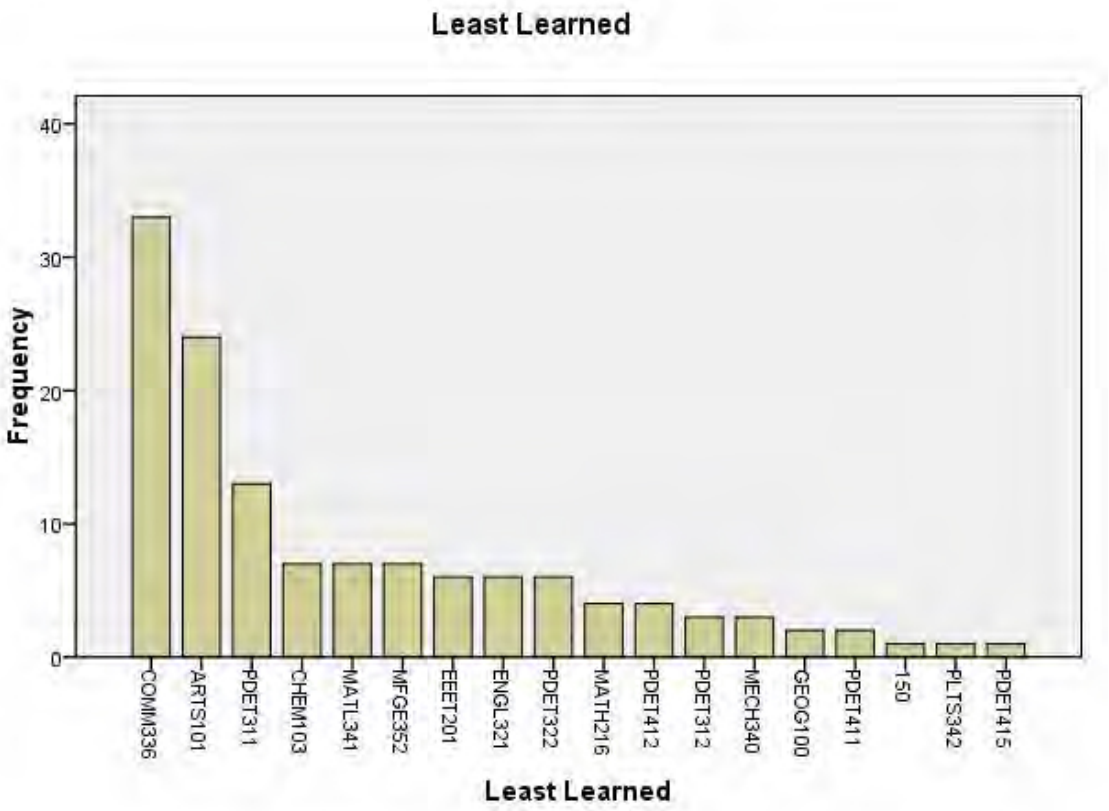
Analysis; The responses to this question indicates that the on-campus PDET students thought that PDET 411 (Machine Design) was the most difficult course in the PDET program. This is a change from prior program reviews in which the senior project course (PDET 499) was typically indicated as the most difficult program course. Since PDET 411 and 499 are both identified as difficult, it is not thought that this change is significant.

Course with the Most Learning. This question asked the student to indicate which course(s) in the PDET curriculum in which they perceived learning the most.



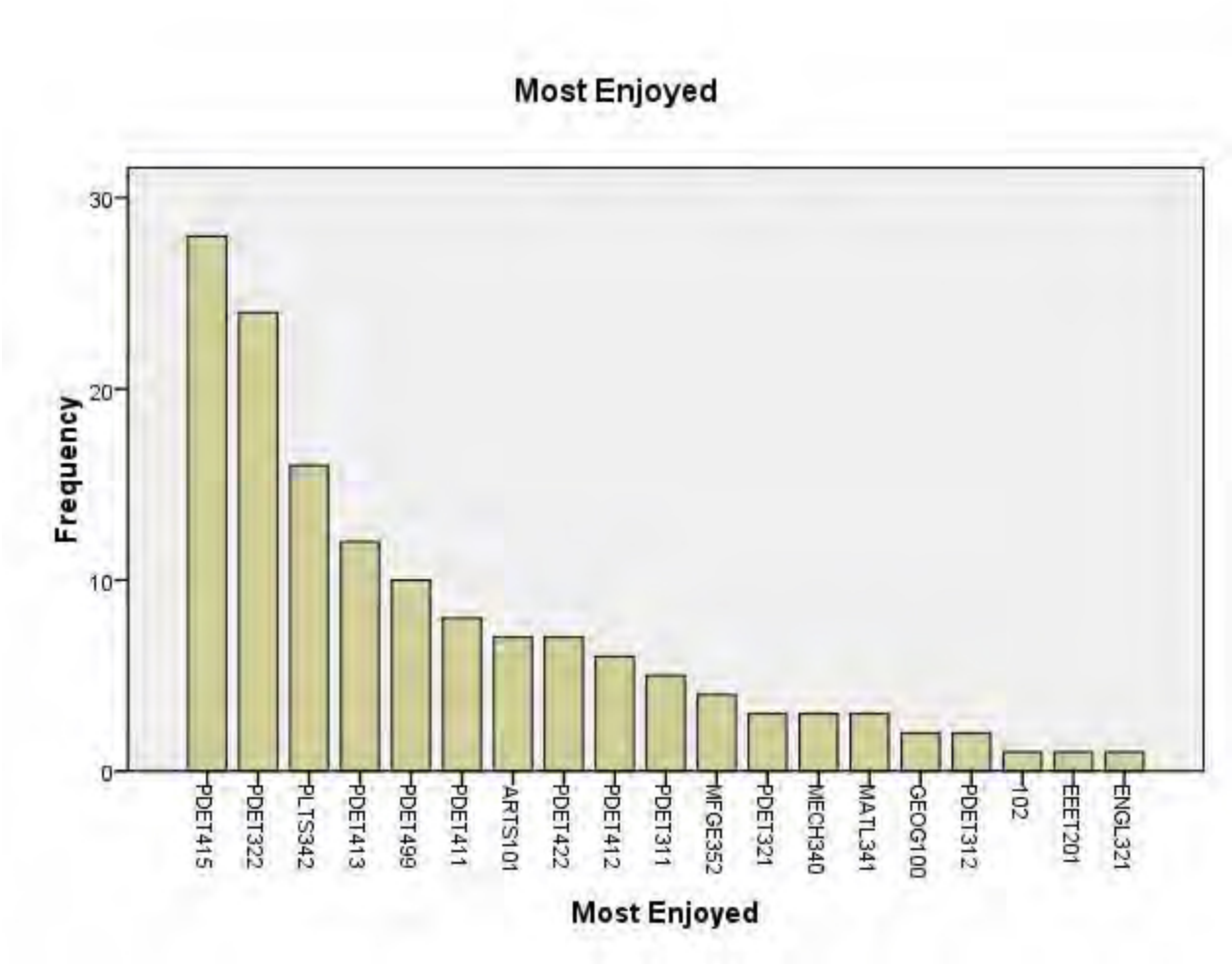
Analysis; The responses to this question indicates that the on-campus PDET students thought that PDET 411 (Machine Design) was the course in the PDET program in which they learned the most. This is a change from prior program reviews in which the senior project course (PDET 499) or Thermodynamics (PDET 413) were typically thought to be the most difficult program course. Since PDET 413 and 499 are both identified as difficult in these results, it is not thought that this change is significant.

Course with the Least Learning. This question asked the student to indicate which course(s) in the PDET curriculum in which they perceived learning the least.



Analysis; The responses to this question indicates that the on-campus PDET students thought that COMM 336 (Advanced Communications) was the course in the PDET program in which they learned the least. It is notable that most responses identified required related or general education courses. The content and methodologies of these related courses is not controlled by the PDET faculty. The PDET prefix course identified as providing the least learning was PDET 311. This course is an introductory seminar that provides an orientation to the PDET program and the design profession. It is a one credit hour course (the smallest PDET prefix course) and is somewhat similar to FSUS 100. It is therefore reasonable that the amount of learning would be perceived as low for this course.

Most Enjoyable Course. This question asked the student to indicate which course(s) in the PDET curriculum that they enjoyed most.



Analysis; The responses to this question indicates that on-campus PDET students thought that PDET 415 and PDET 322 were the most enjoyable courses in the PDET program. These courses are a two course sequence in which students learn solid modeling using ProEngineer software on their personally owned laptop computers. The hands-on, graphical nature of these courses is predictably attractive to PDET students and supports the use of laptop computer instruction. PLTS 342 (Plastics Material Selection) is a related course and is historically highly regarded by students.

Best Course. This question asked the student to indicate which course(s) in the PDET curriculum which they thought were the best overall.

Analysis; The responses to this question indicates that on-campus PDET students thought that PDET 411, PDET 422 and PDET 499 were the best courses in the PDET program. PDET 499 is the program capstone project course. PDET 411 and 422 are a two course Machine Design sequence. These results do not exhibit any significant change in student perceptions and support the student perceived value in courses with a focus on the application of technical knowledge.

Worst Course. This question asked the student to indicate which course(s) in the PDET curriculum they thought was the worst overall.

Analysis; The responses to this question indicates that on-campus PDET students thought that COMM 336, ENGL 321 and CHEM 103 were the worst courses in the PDET program. COMM 336 (Advanced Communications) is a public speaking based course and ENGL 321 (Advanced Technical Composition) have decreased in perceived value since PDET program specific course sections and instructors were discontinued approximately five years ago. CHEM 103 (Basic Chemistry) is historically not highly regarded by PDET students. The remainder of the courses identified were selected by only one or two students during the seven years evaluated and do not indicate broad dissatisfaction.

Open Response Question 1. This question was added to the on campus graduating student survey in 2010. The question asked the students to suggest one change that they would recommend for the PDET program.

"If you could change one thing about the PDET program, what would it be?"

All responses are provided in Appendix B. A selection of the most appropriate and relevant responses obtained were;

2010 Comments:

- Nothing
- Internship
- Have internship, CNC
- I would change the order and have 422 and 413 switched so we know FEA before working on 499
- Have a more structured PDET 499 class to limit procrastination

2011 Comments:

- More preparation for the extent of the work for the 499, up until that class I seldom had to work hard to success
- n/a, every class taught me something new and valuable. I just really don't enjoy English even when I know it will help out later.

2012 Comments:

- Nothing, great program
- Education on multiple software 3D modeling programs

2013 Comments:

- More time for the project
- (make PDET 499) full year
- Make it a four-year program
- Add senior project classes to fall 4th year
- PDET 499 should be broke up into two semesters - not all of it – just some

Analysis; The responses to this question indicate a variety of responses that vary both by individual student and by class year. The most common recommendation made by multiple student surveys would be to extend the capstone project activity (PDET 499) from one semester to a two semester sequence to provide additional time to complete the activity. Changes in existing courses are being evaluated by the program faculty that would allow at least the project selection part of this course to begin earlier. It should be noted that the senior project selection process was historically introduced during the ENGL 321 class taken in the Fall semester before the project course (PDET 499). The departure from a program specific ENGL 321 however made that practice impractical, leaving students little advance planning time before starting the final semester and completing the project. An alternate means of providing an earlier introduction to the project is needed.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Advising Satisfaction	98	2.00	5.00	4.5918	.66715
Overall Program Sat.	98	2.00	5.00	4.5663	.60767
Laptop PC	80	1.00	5.00	1.4063	.83474
Annual Starting Salary	14	32000	72000	51464.29	10378.351
Valid N (listwise)	0				

Evaluation of Academic Advising. 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 4.59 with a standard deviation of .67. This indicates a high level of satisfaction with the academic advising provided to PDET program students.

Evaluation of Satisfaction with the PDET Program. 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 4.57 with a standard deviation of .61. This indicates a high level of satisfaction with the education provided to PDET program students.

Graduating Student Employment. This question asked graduating students to describe their employment status at the time that they completed the program. This question was present on the on-campus surveys from 2010 through 2013 and allowed the students to select one of 4 categories. The results are shown in the accompanying table.

Employment Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	At Least 1 Good Offer	34	34.0	55.7	55.7
	Search Started - No Offer	21	21.0	34.4	90.2
	Not Seeking Employment	6	6.0	9.8	100.0
	Total	61	61.0	100.0	
Missing	System	39	39.0		
Total		100	100.0		

Analysis; The responses to this question indicate that, based on 61 responses, 34 of 61 students (56%) had a least one acceptable offer of employment at the time that they completed the PDET program. In addition 21 of 61 (34%) students reported unsuccessfully searching for employment and 6 of 61 (10%) students were not yet

seeking employment. On categorical response, “Have job offer(s) but none that are attractive”, was not selected on any survey.

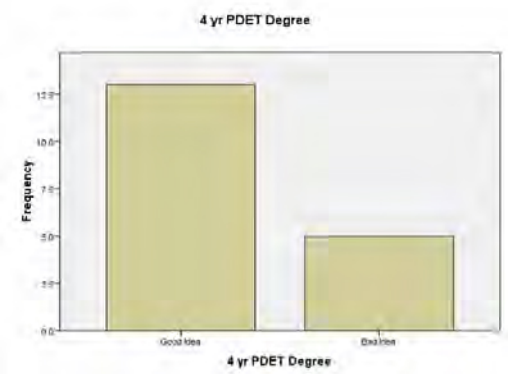
Highest Starting Salary. This question asked graduating students in the 2013 graduating class to identify the highest annual starting salary offer that they had received. These students reported an average starting salary offer of $51,454 with a minimum of $32,000 and a maximum of $72,000.

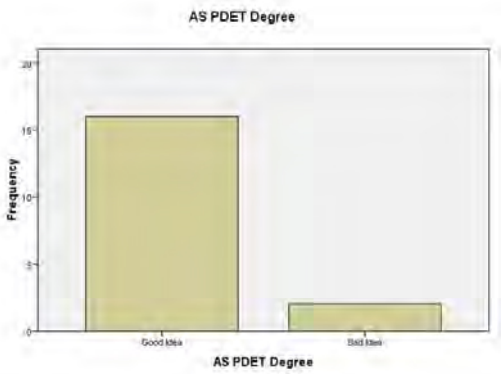
Analysis; The responses relating to employment show that PDET program graduates are highly employable with excellent starting salaries.

Four Year PDET Program Questions. Two questions regarding the future creation of a four year PDET degree program were presented to graduating students. Currently the PDET program exists in a 2+2 format and contains only third and fourth year classes. A number of first year students apply to Ferris State seeking a Product Design degree and react negatively when informed that they must first complete an Associate Degree in a different area of study before formally becoming PDET students. A four year degree option has been suggested as a means to increase program enrollment by offering the opportunity for students to begin the program as Freshman. Any such expansion of the program would not change any existing entry path from 2 year degree programs either from FSU or from any Community College. In addition, the first two years of the program would be largely composed of selected courses from existing offerings and include adequate general content (mathematics, science, communication, general education) to be compatible with many other College of Engineering Technology four year programs.

The first question on the survey asked if creating a four year PDET degree option was a good idea. Thirteen of 18 responses indicated that the graduating class of 2013 thought that this idea had merit.

The second question on the survey asked if a four year PDET degree option should provide an Associate degree after two years were completed. Sixteen of eighteen students thought that awarding an Associate degree after two years in the four year program would be a good idea. The following graphics illustrate these results.





Analysis; Graduating students in 2013 thought that providing entering first year students with the option to complete a four year degree in product Design would be a good idea. These students also indicated that including a two year credential in a four year program would be desirable. Based on this response, the creation of a four year degree in Product Design Engineering Technology should be given further consideration.

Open Response Question 2. This final question was included on all graduating student surveys from 2007 through 2013. The question asked the students to provide comments or recommendations about the PDET program.

"Please feel free to add any comments or recommendations about any aspect of the PDET program in the space provided:"

All responses are provided in Appendix B. A selection of the most appropriate and relevant responses obtained were;

2007 Comments:

- Program was awesome, learned a lot. Professors were great and very helpful.
- I didn't want to buy a laptop, but it was nice to have the software and be able to take it with me instead of coming to the lab.
- Should maybe require an internship
- Thanks for everything
- I really enjoyed this program – thanks!
- Incredible experience. Thanks for everything!

2008 Comments:

No comments on surveys due to administrative error.

2009 Comments:

- I learned a lot in PDET. It makes you work harder than the associates; however, it feels more rewarding. Overall a great program.
- I enjoyed everything I learned. I feel that I experienced a number of aspects of design that will help in the future.
- I enjoyed my time here, learned a lot, great program
- Give more information about senior project before this semester so we could work on it earlier.
- I feel that the program should use different software other than PRO-E. Also I feel that the projects preliminary and final proposals should be due sooner in the semester.
- I believe that different CAD software would be better. Approve projects end of the fall semester so the full spring semester can be used to work on the project.

2010 Comments:

- Good class content required for program

2011 Comments:

- Overall, a challenging major. My biggest concern has to do with the 499 project. I feel little prior to the project prepared me for the extent of the work needed to complete it. I spent nearly every minute working to complete the report and I still wish I had more time.
- I am satisfied with my experience while in the PDET program. The professors, Mr. Goosen and Mr. Koepf, were really helpful whenever I needed help. I would highly recommend this program to anyone who is thinking about going into it.
- I enjoyed the PDET program very much and the one class that I thought was the best and most useful was the senior project because it teaches the student what critical things must be done throughout the design process and gives them something to show future employers as an indication of their work ethic.
- I thoroughly enjoyed this program. The content is excellent and I feel prepared to handle any job thrown my way. Thank you very much for all of your hard work and dedication to the learning of your students. Your passion shines through.

2012 Comments:

- Thank you for the past two years. Really learned a lot from everyone and appreciate the way things were taught. Thank you very much.

2013 Comments:

- A two-year degree would be good for people that are looking to be a CAD jockey
- Best opportunity ever!!
- I feel like the PDET program should be a four-year degree because I would like to see more manufacturing done that deals with our designed parts.

Analysis; The responses to this question indicate the most common recommendation made by multiple student surveys would be to make changes to extend the time provided to complete the capstone project activity (PDET 499). Changes to accomplish this are currently being considered by the program faculty. A number of other responses to this question indicated that graduating students are highly satisfied with the PDET program. All responses are provided in Appendix B.

College of Engineering Technology Survey Results

A survey was developed by the College of Engineering Technology Administration and presented to graduating students beginning in 2009. The completion of this survey is mandatory for graduating CET students. At the time of this program review, the results of four survey years (2009, 2010, 2011 and 2012) were available to the PDET program faculty. These results, compiled by Institutional Research and Testing, are summarized in the following table.

Year	Number of Questions	Responses
2009	42	6
2010	52	3
2011	52	5
2012	55	9

Collectively these surveys offer a limited response level (25) relative to the 100 responses developed in the program based surveys used in the analysis. It is probable that the large number of questions (more than 50) and the on-line format contributed to this very low response level. The questions on this survey, developed by the CET administration rather than the program faculty, are wide ranging and in many cases of little direct relationship to student perceptions regarding the PDET program. The most serious limitation of the survey however is the absence of any authentication or validity checking of the results. For example, the most recent survey result reflecting 9 responses from students graduating in 2012 attempted to identify the names of the students completing the survey. Eight of the nine students identified themselves and two of the responding students were never enrolled in the PDET program. The remaining six responses were evenly divided with responses from three off-campus students and three on-campus students. There are significant differences between the on-campus and off-campus programs and students, yet the survey does not provide separate responses from these groups. Overall due to the limitations in the validity and the small number of responses, the CET survey results were not used for this program review. A copy of the most recent CET survey results, as provided by Institutional Research and testing, are provided in Appendix B as supplemental information.

D. STUDENT PROGRAM EVALUATION:

With only two class years of students, an adequate survey of student perceptions was obtained by surveying graduating PDET students for each year since the last program review and using the combined results for the analysis of sections 2C and 2D. Please refer to the results of the survey found in Section 2 C above.

E. *FACULTY PERCEPTIONS:*

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. The faculty are among the highest in student credit hour production in the College of Technology and are above the FSU average 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 have completed graduate level degrees from other universities at their own expense in many cases while accommodating a teaching overload. In addition the faculty completed other technical training classes and seminars which were in nearly all cases scheduled outside the academic year so as not to impact classes.

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 ten years before any other program in the college. This actually produced a reduction in College of Technology expense concurrent with increasing student satisfaction and learning. This model has now been incorporated by several other CET programs. When the university mandated assessment using the TRACDAT assessment system, the PDET program, implemented the methodology for all courses (2 years or longer) and for program level assessment (4 years) despite serious misgivings with respect to its effectiveness. The program has changed the structure of its largest course to accommodate a lecture – recitation format. This uses one large lecture section and multiple smaller recitation sections to reduce contact hours while preserving a suitable level of close student contact. This was the first known use of a lecture – recitation in the CET and has reduced the delivery cost for this course.

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 that it uses a minimum of faculty, space and associated resources (such as computer support). 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 will take 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. Licenses have been negotiated by the program faculty that allows critical solid modeling software to be operated on individual student owned laptop computers without a server based license control system. This critical software has been incorporated across other CET programs allowing costs to be shared with two other programs while servicing approximately 500 students at a cost of less than $3000 / year.

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 does 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 quality 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. In addition external sources of new students have been made a priority rather than focusing on enrollment from Ferris two year programs. To accomplish this, relationships with the faculty at a number of community colleges have been developed and pre-admission advising services are offered to community college first and second year students to encourage enrollment.

Degree of commitment by the administration.

The small size of the PDET program and its limited cost and facility requirements have created a low level of administrative awareness of the program within the college and university administrations. The program also operates with little visibility because of the organizational structure and the lack of time on the part of the program faculty to lobby for increased exposure. Overall however the PDET requires 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 difficult to find on 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 or random discovery. 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 on-campus enrollment. In addition the willingness of the administration to allow the development of Bachelor of Applied Science (BAS) degrees at satellite locations has lead 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 will reduce the viability of the program unless new enrollment sources are identified and cultivated.

PDET program processes and procedures.

The Product Design program stresses the advising process and the management of block scheduling that prioritizes program course scheduling below that of other required courses. This means that a clear two year path to a PDET degree is always maintained. While this does not guarantee that all program 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 has been a continuing priority. PDET senior projects are reviewed and evaluated by industrial representatives. Program presentations and design activities are configured to duplicate 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 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.

There continues to be suggestions made by both students and advisory board members to develop a "design studio" atmosphere that could be a real showcase for industry and a major marketing tool for the PDET program.

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.

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 Design Certificate which was just implemented last year. It bundles 4 of the PDET courses that give students the tools necessary to generate 3 dimensional models, understand the product – human interface, and read technical drawings. This skill set can be couple with any degree as design is not specific to one industry. Anything ever made from any material was first designed by someone. Most notably Automotive Engineering Technology students have found this to be a path that sets them apart from many other applicants and many have found that the design field is where they want to be. Employers have found this combination very attractive.

The PDET 122 course was developed through the collaborative efforts of the Manufacturing and Tooling Technology programs and Product Design Engineering Technology. The course has been altered significantly to match the needs of the Tooling Technology program. It was initially designed to cover a range of topics such as engineering graphics, geometric dimensioning and tolerancing, and 3-D modeling. It has since been revised to just 3-dimensional modeling using CATIA software. It is intended to expose the student to the basics of modeling and prepare them for the CNC course which also uses CATIA.

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. Through the use of new technology, students are able to design, develop and make a rapid prototype of a part of their choosing. The budget was set at fifty dollars per student. So long as the budget for PDET stays intact, the program should be able to continue to provide this very unique experience for the students.

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.

In the past, the influence of the administration has not had a large impact on the PDET program. Currently, I feel very positive about Dean Yates and her commitment to the College of Engineering Technology. If the PDET program can get some interest from the administration in facilities, the design studio could become a reality. 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.

Students are required to purchase a laptop/notebook computer prior to entering the program. 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.

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 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.

F. 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. A disproportionate number of female representatives serve on the committee in an effort to insure program changes help to encourage an increase in female students. While most members of the committee are active engineers and/or leaders in companies' representative of those which employ program graduates, a Michigan community college representative has been added to the committee since the last program review in 2006. Current members of the board with titles and relevant backgrounds are;

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

Robert Glover, Engineering Manager, Savant Automation. BS Western Michigan University, Mechanical Engineering. Member since 2007.

Brett Kooistra, Director of Design & Development, Leggett and Pratt Office Furniture. Graduate of on-campus PDET program in 1994, Member since 1999.

Bill Peless, Product Design and Engineering Manager, Irwin Seating, Inc. BS Western Michigan University, Mechanical Engineering, Member since 2010.

Randy Kopf, Professor CAD, Kellogg Community College, BS Western Michigan University. Community college representative. Member since 2010.

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, Applied Physics.

John Colasanti, Consulting Engineer and Owner, Annex Design LLC. Graduate of on-campus PDET program in 2003. Member since 2011.

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

The most recent meeting of the IAC was held in November of 2013. The meeting was attended by the two PDET program faculty, the CET Dean and eight of the nine committee members. Notes of this meeting are provided in Appendix B. In order to solicit the evaluations and suggestions of committee members, two short confidential

surveys were issued. Copies of both surveys are provided in Appendix B. The first survey instrument allowed the committee members to evaluate the effectiveness of the 11/30/12 meeting and to make suggestions/comments regarding the PDET program in general. The second survey instrument was provided to solicit committee input about the PDET academic assessment program. This survey was presented following a description of program outcomes and a presentation of the data collected using the TRACDAT assessment software from 2010 through 2012. The responses provided via these survey instruments were as follows;

Meeting Evaluation Survey Results

Meeting Evaluation – Question 1. *How informative did you find today's meeting?*

IAC members were requested to respond using a scaled response. Responses were encoded on a 1 to 5 scale, with 1 designated as 'Lacked Content', 3 as 'About Right' and 5 as 'Excessive Content'. Three of seven responses were 'About Right' and four responses indicated that the amount of material was slightly excessive (rating = 4).

Meeting Evaluation – Question 2. *Please evaluate the location/facilities for today's meeting*.

IAC members were requested to respond using a scaled response. Responses were encoded on a 1 to 5 scale, with 1 designated as 'Needs Improvement', 3 as 'Adequate' and 5 as 'Very Good'. Four of seven responses were less than adequate, two responses were 'Adequate' and one response rated the meeting facilities as excellent. The 11/30/12 meeting was held in a modified classroom in the Swan Building. Overall this response indicates that future meetings could be improved by using a more professional setting.

Meeting Evaluation – Question 3. *Please evaluate the duration of today's meeting*.

IAC members were requested to respond using a scaled response. Responses were encoded on a 1 to 5 scale, with 1 designated as 'Short', 3 as 'About Right' and 5 as 'Long'. All seven responses indicated that the duration of the 11/30/12 meeting (approximately 4 hours) was "About Right'.

Meeting Evaluation – Question 4. *What topics would you like to see presented and/or discussed in future meetings?*

This open response question provided the following responses;

- I am good with the material presented.
- Conversations about what the industry may need or lack when hiring individuals. What could the PDET program do to strengthen its graduates.
- Marketing the program – more exposure of FSU in industry (leveraging past grads)

- Enrollment / Marketing strategies
- Student employment statistics – even if incomplete. e.g. highest and lowest starting salaries of last class.
- Student internships. Promoting high school student summer camps introducing CAD and design.

Most of the areas recommended for future presentation/discussion were addressed in the 11/30/12 meeting and are typically a part of each committee meeting. The areas identified in these responses will, however, receive added emphasis in future meetings.

Meeting Evaluation – Question 5. *Please provide any suggestions / comments regarding today's meetings.*

This open response question provided the following results;

- Very good content
- Informative meeting with appropriate content
- This was a good meeting covering not only the needs of the program but an update on student placement and where the school is headed.
- Dean Q/A at meetings would be great
- Very informative

The responses provided for question 5 indicate that the attendees of the 11/30/12 meeting were satisfied with its content.

Meeting Evaluation – Question 6. *Please provide your overall assessment of how well the Product Design program is meeting the needs of industry and its students.*

IAC members were requested to respond using a scaled response. Responses were encoded on a 1 to 5 scale, with 1 designated as 'Not Adequate', 3 as 'Adequate' and 5 as 'Exceeds Needs'. All seven responses indicated that the PDET program was adequately (3 responses) or more than adequately (4 responses) meeting the needs of industry and its students. This indicates that the committee members were satisfied with the effectiveness of the current PDET program and its curriculum.

Meeting Evaluation – Question 7. *Please provide any suggestions / comments regarding the Product Design program.*

This open ended question provided the following responses;

- Continue to work on ideas to sell program. This is the type of program that industries need with students leaving school.
- You continue to do an outstanding job!
- Needs enrollment/marketing help to ensure 20 grads/yr.
- Increase enrollment will help assure survival. Additional marketing will help toward that goal. Accomplishing the additional marketing will be the challenge.
- Emphasize the importance of GD&T. Tie it to how manufacturing needs GD&T for fixtures, CMM and Quality.

The only general conclusion to be drawn from these responses is that the IAC recognizes the need for the PDET program to improve its marketing. The IAC indicates that it believes that the program offers adequate value to its students and their potential employers but needs to better present this information to potential students to increase enrollment. The PDET program faculty accepts this conclusion and the associated recommendation and is currently attempting to obtain assistance in better marketing the program.

Program Assessment Evaluation Survey Results

IAC members were provided with a summary of PDET Academic program assessment results from 2010, 2011 and 2012 (see Section 3-I and Appendix B) through June 2012. The committee was also familiarized with the five PDET program outcomes used for that assessment and then asked the following open ended questions;

Program Assessment Evaluation – Question 1. *Identify any of the 5 outcomes that you think should be eliminated.*

IAC members provided the following responses;

- The outcomes are good measures of success or discovering a problem.
- None
- While I completely agree that expertise in CAD is mandatory for designers today, I do believe that as an outcome it could be included in one of the others or treated as a course outcome.
- None
- None
- None

The conclusion to be drawn from these responses is that the IAC as a group supports the continued use of the five outcomes used since 2010. The input regarding the CAD objective noted as an exception.

Program Assessment Evaluation – Question 2. *Identify any additional / different outcomes that you think should be added.*

IAC members provided the following responses;

- I would add success percentage that get jobs leaving the program.
- None
- I really like the concept of tracking the success rate of employment of graduates.
- Heavier emphasis on written vs (oral) presentation.
- Ingenuity and creativity. Innovation content.
- Expanding the CAD evaluation to encompass modeling.

In response to the IAC recommendations, a sixth program outcome tracking employment success was added. The other recommendations are noted for future consideration.

Program Assessment Evaluation – Question 3. *In your opinion are there any of the five outcomes that are more important than the others? Please identify those outcomes.*

IAC members provided the following responses;

- I think mechanical design and CAD are the (2) most important outcomes.
- No I definitely agree with your choice to include both the ability to perform solidly in both written and oral communication.
- See #2 (written communication)
- #1 (Mechanical design).
- In order of importance 5 (Fundamental technical knowledge), 1 (Mechanical design), 2 (Computer Aided Design), 3 (Written communication) and 4 (Written communication).

The IAC responses do not indicate any consensus that one outcome is more important than the others.

Program Assessment Evaluation – Question 4. *In your opinion are there any of the five outcomes that are less important than the others? Please identify those outcomes.*

IAC members provided the following responses;

- I think that all 5 outcomes have importance and should remain part of the program.
- The movement of the CAD to a course outcome should not be considered a "less important" aspect but more of "a given" basic that is expected and that can be measured at a more fundamental level.
- #3 (formal presentation)
- No
- Written communication, in the form of a full report, is not required in industry as much as CAD, Fundamental technical knowledge or Mechanical design.

The IAC responses do not indicate any consensus that one outcome is less important than the others.

Program Assessment Evaluation – Question 5. *Do you have any general thoughts on the program level assessment of the PDET program?*

IAC members provided the following responses;

- It will be interesting if these outcomes show a decline that can be related to (the growth) growth of on-line classes.
- The program is being handled very well. Is there a 'standard of work' that students must follow & do they understand (the 5 outcomes)?
- I think it is a well balanced approach. I like using the capstone project for the evaluation and wouldn't change much.

These responses indicate that the IAC is supportive of the assessment practices in use for the PDET program.

Section 3: Program Profile:

A. PROFILE OF STUDENTS.

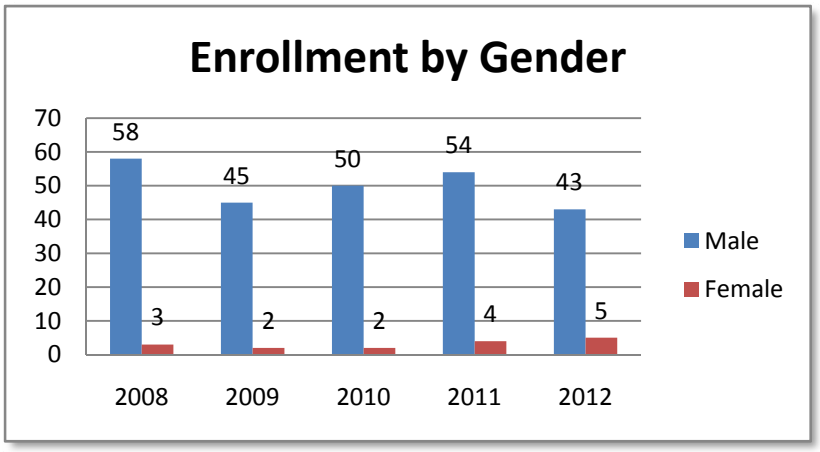
The Product Design Engineering Technology program, designed as a 3rd and 4th year (+2) program, has only upper division students. In addition to the on-campus student body there is an off campus component of the program offered in Grand Rapids at the Applied Technology Center (ATC) in an evening format 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.

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 Associate's Degree either at FSU or a Michigan community college.

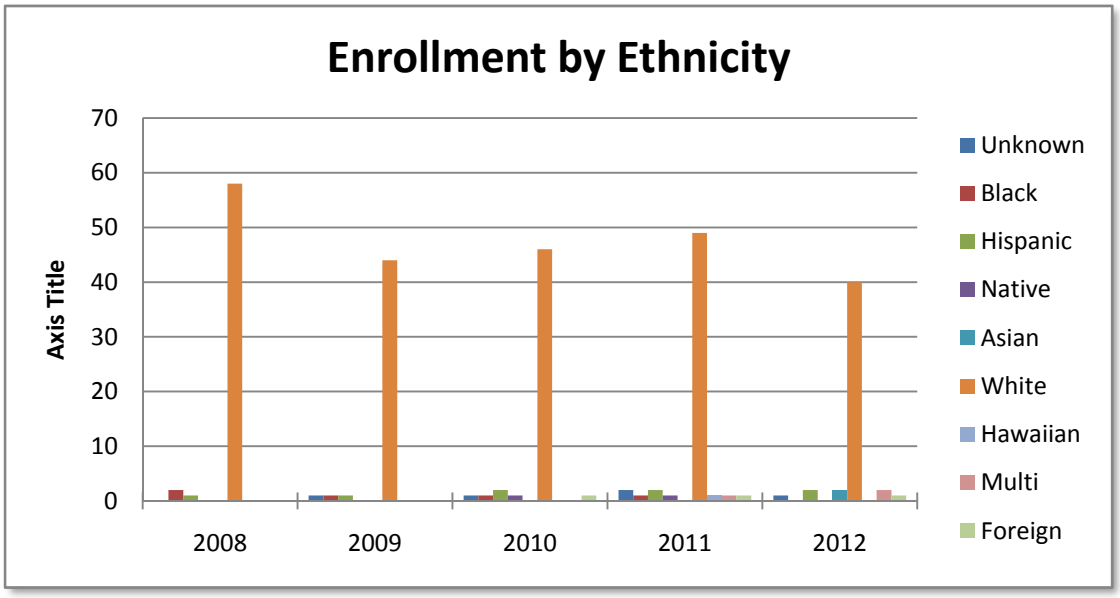
The PDET program provides the same instructional content (usually taught by the same instructors) to students completing the program in Grand Rapids as that provided to on-campus students. Since the on-campus and off-campus programs are largely asynchronous due to different start times and the number 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.

The institutional data regarding gender, race/ethnicity and age, which can be seen in the charts below, indicates that an overwhelming number of PDET students are White/Caucasian males who come from within Michigan and who typically stay in Michigan after graduation.

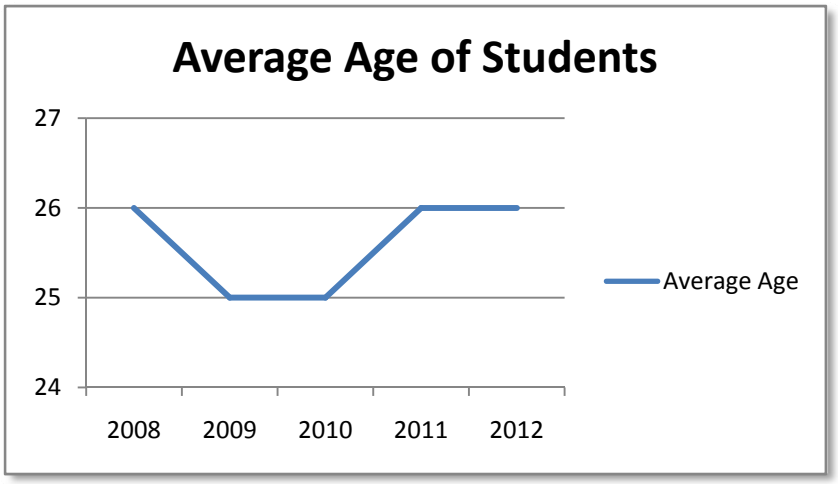
Enrollment for Fall 2013 shows a significant increase in the number of female students entering the program. If the data were included in the chart below, it would show an increasing trend for female students over the past four years. The exact cause of this favorable trend is not known at this time.



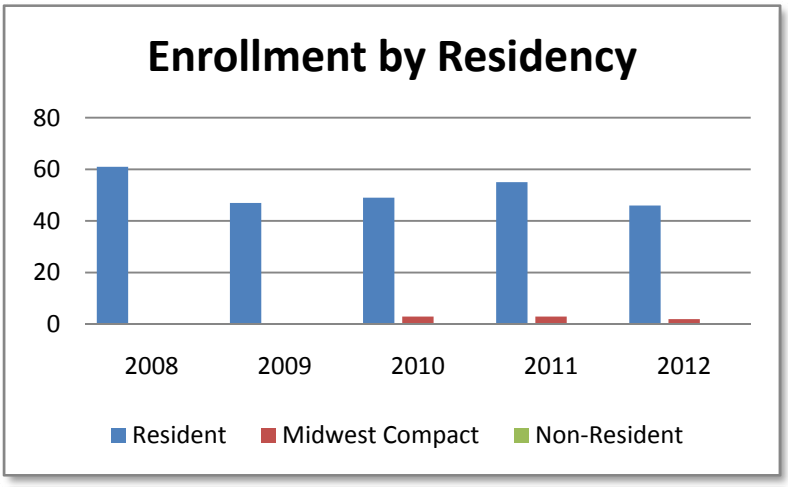
While it appears that the ethnicity of the majority of PDET students is still White/ Caucasian, it can be seen by the chart below that an increase in the variety of ethnic groups has increased within the program. The numbers are still quite small in comparison but it does show a somewhat positive trend in the area of diversification.



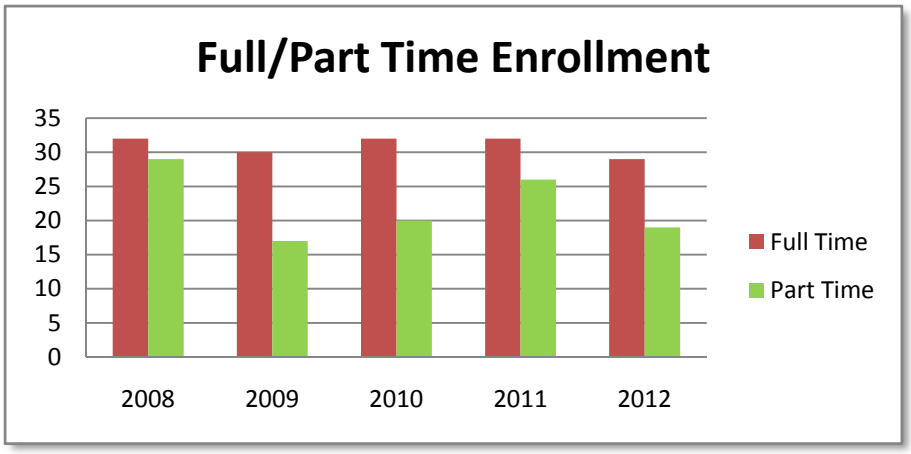
As stated above, the PDET program is a (+2) 3rd and 4th year program. As such the students enrolled in the program tend to be slightly older than those entering other programs as freshman. In addition, the strong off-campus enrollment consists largely of non-traditional students. This contributes to the slightly higher average age of PDET students as seen in the chart below.



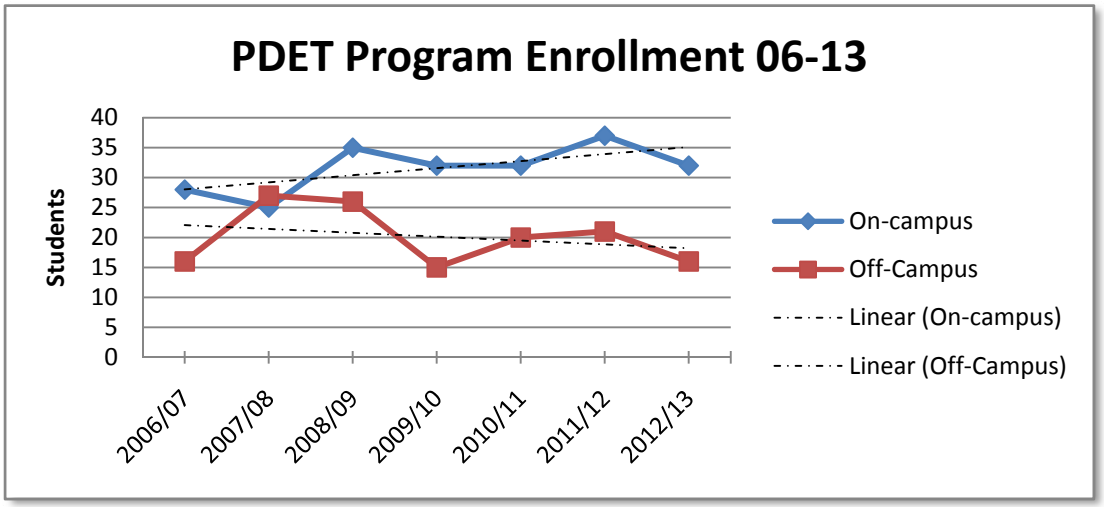
As can be seen in the chart below, the PDET program receives very few students from outside the state of Michigan. Starting in 2010, we have seen a small increase in students from surrounding states. It is the perception of the PDET faculty that there are three main reasons for this trend. The first and most significant is the high cost of Out-of –State tuition, second is the lack of program specific marketing, and third is the lack of time for faculty to spend in recruiting efforts.



Due to the off-campus course offerings in Grand Rapids through the Applied Technology Center, the PDET program continues to show a large number of part time students. 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 full time in Grand Rapids is typically under-estimated. See the chart below.



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. As is shown in the chart below, trends for on-campus and off-campus enrollment are diverging. On-campus enrollment is increasing while off-campus enrollment is declining.



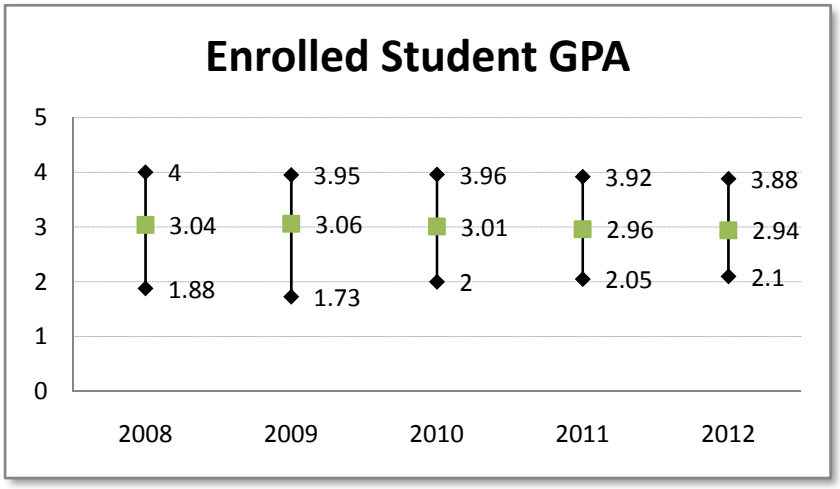
The increase in on-campus enrollment can be attributed to several factors. One of which is the relatively recent addition of service courses provided by PDET faculty for other programs. While the faculty does not pursue students in these courses, it does give the students exposure to the field of Product Design, many of which find that they have a real desire to work in this field. This has increased both the number of transfers and students staying to get a second B.S. degree in PDET. The economy and lack of unskilled labor jobs is also believed to be a factor in the number of students at the university in general.

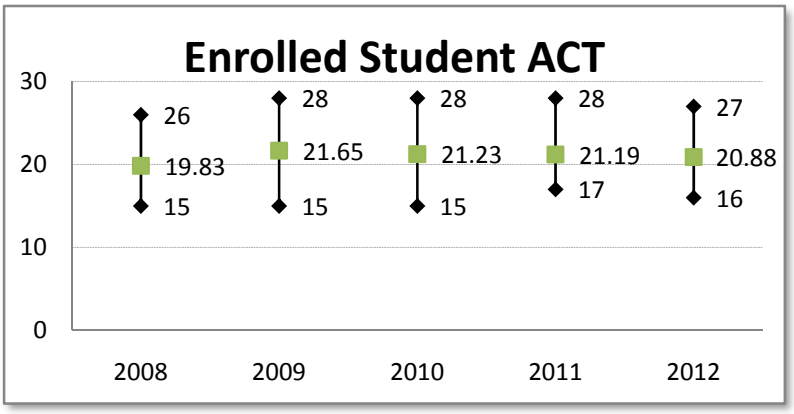
The decrease in off-campus enrollment was predicted in the last Academic Program Review in 2006. "Although the enrollment data shows less of a declining trend for off campus students, recent indications are that a more severe decline is likely." The primary cause of off-campus enrollment decline in Grand 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. In many instances, companies require a B.S. degree for promotion with little regard for the subject matter. 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.

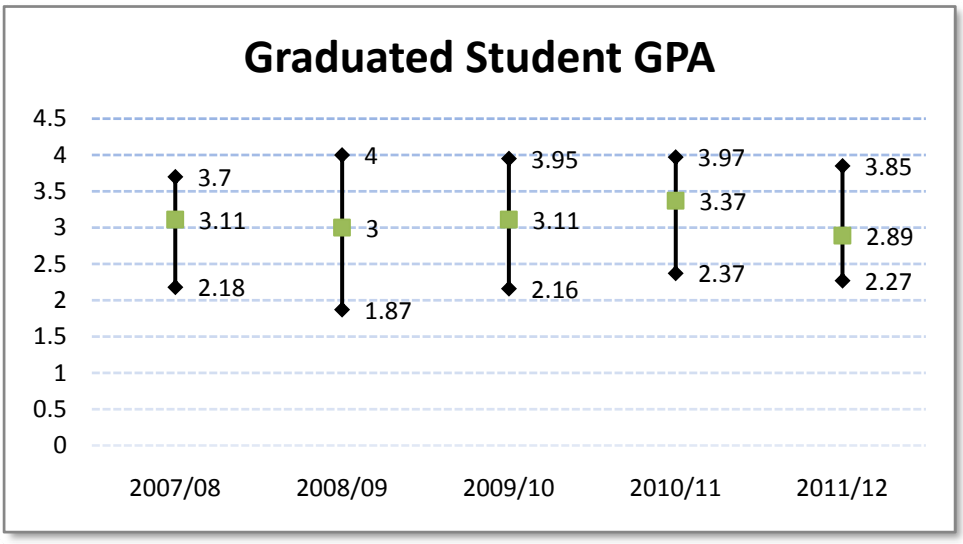
In addition fewer students from the CDTD program, which has historically been the largest source of students, are available due to decreased enrollment in that program. Therefore we see fewer CAD based students entering the program. This has been offset however by an increase in students from non-CAD related programs.

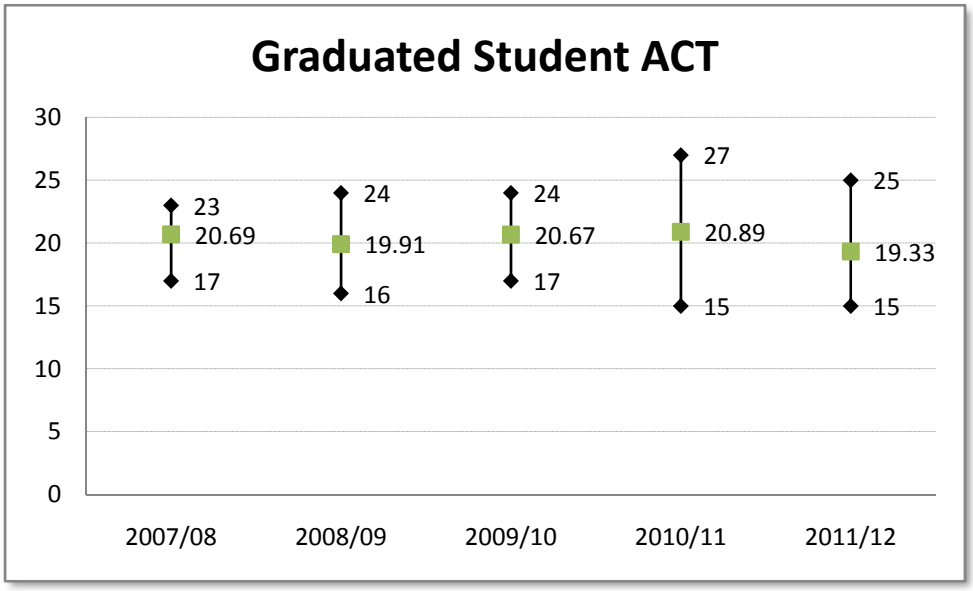
The data shown below represent student GPA and ACT scores for students initially enrolled in the program. It can be seen that both measures are very consistent. There is only a .12 range in average GPA and a less than 2 point range in average ACT scores for what could be termed incoming students.





The same trend can be seen for the graduating students with a .48 range in average student GPA and a less than 2 range in average ACT scores for exiting students. This data is consistent with the retention data seen in section 3D.



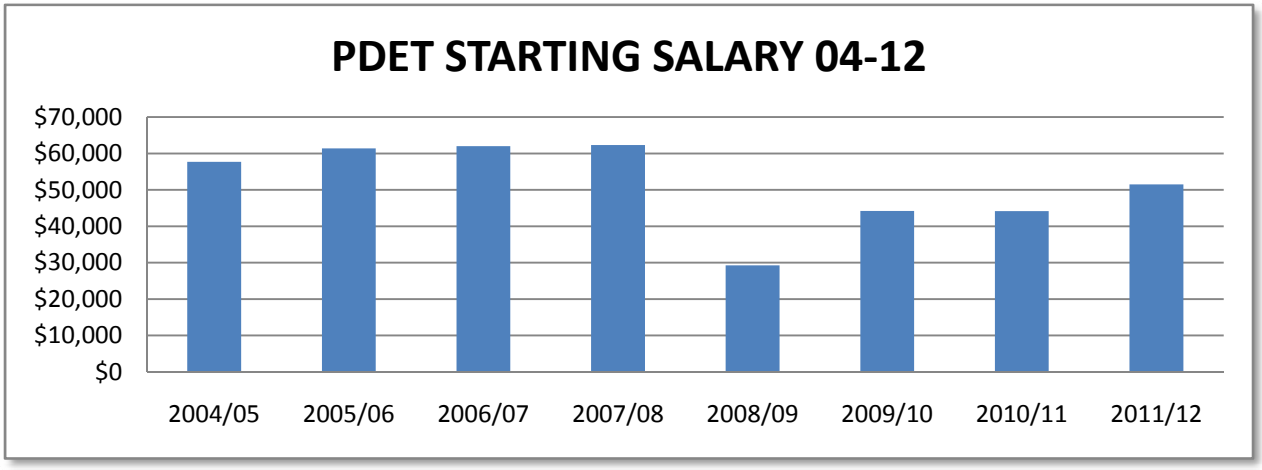


Product Design entrance requirements are such that a student must have an overall GPA of 2.5 or higher and a grade of C or better in all prerequisite courses. These have been found to be the only criteria that can be applied to any student from any program or institution on an equal basis. This format has proven to be successful as evidenced by the high success rate of enrolled students.

Academic rewards for students in the Product Design Engineering Technology (PDET) program have been limited to Deans Lists recipients and those receiving scholarships from various sources. At this time there are no program specific scholarships available. The PDET program does recognize and award an outstanding student within program each year. The candidate receives a plague an special recognition at the PDET senior award luncheon held each Spring semester.

In addition, several small awards are given throughout the program. In the PDET 311 seminar course, awards are given for the best design of a product chosen by the instructor. In PDET 415 the students are involved in a semester long design and development of a three wheeled vehicle. Awards are given out at the senior luncheon for the top three designs, as chosen by the incoming junior class.

Product Design program graduates have a 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. The chart below provides an overview of starting salaries as reported between 2004 and 2012.



The noticeable drop in starting salaries occurring in 2008/2009 is thought to be related to reporting errors and not necessarily reflective of the actual job market. From section 1C the mean annual salary for Commercial and Industrial Designers as reported by the Bureau of Labor and Statistics is approximately $58,000. This number is not a starting salary but rather a mean salary for the designers surveyed. It should be noted that preliminary indications of starting salaries for the 2013 graduating class are at or above this value.

To aid in the employment of Product Design students, they are encouraged to attend the job fairs held at Ferris. Faculty reschedule classes on the day of a job fair to give the students the opportunity to spend as much time as they can with potential employers. In addition, Career Services is invited to give a lecture in the PDET 499 capstone course. In

past years this has been a very good experience for the students. A representative from Career Services would come in lecture on how to navigate through the website, find links to potential employers and post resumes. However, this past year, when asked to present, they sent over a student worker with a predetermined presentation talking about how to interview properly, even though a specific request for Career Services website training was requested. It is the hope of the PDET faculty that this is not going to be a continuing trend.

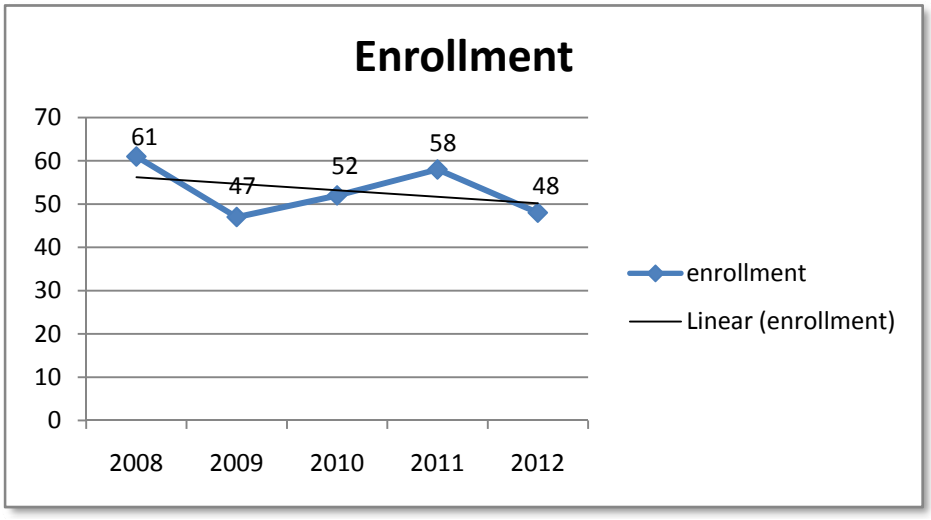
Although the data is not statistically significant due to the small number of respondents, question 22 from section 2A shows that 80% of students responding from as far back as 2006 are still employed in the field of design.

The geographical location of currently employed students continues to show that the majority of students are employed within the state of Michigan. Again, although not statistically significant, question 12 in section 2A shows that 75% of responding students work within the state with one respondent working in Indiana and another in Wisconsin.

With regard to continuing education (see question section 2A) ,none of the respondents have furthered their education. , However, although no data was collected, communications with past graduates has shown that a small percentage of student do continue their education. The most common degree obtained is that of Master of Science in Engineering Management from Western Michigan University. The advisor, Dr. David Lyth, has given several guest lectures in PDET 499, the capstone course, regarding the options available to students when considering whether to further their education.

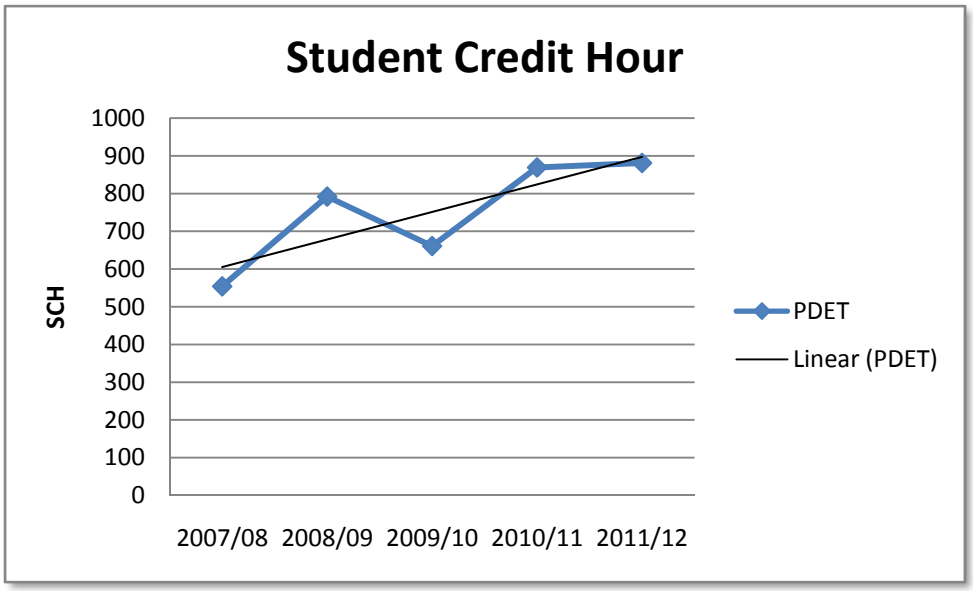
B. ENROLLMENT.

According to the IR&T data, overall enrollment is showing a decreasing trend. This is attributable to the drop in off-campus enrollment as noted earlier. During the same time period on-campus enrollment has shown an increasing trend.



While the program is receiving less on campus transfers, there is more diversity with regard to educational background and locations for those who are applying. The percentage of students that are rejected for various reasons has not changed though no data is recorded. Approximately 50% of students applying meet the eligibility requirements for entrance into the program. Historically, well over 80% of students that meet entrance requirements will enroll.

The Student Credit Hour production from PDET faculty has exhibited a noticeable upward trend over the past five years as can be seen by the chart below. This is due in large part to the "service to non-majors" courses that are offered by PDET faculty. Most notably the Design Certificate which includes 4 PDET courses. The certificate is explained in greater detail in Section J.



Past efforts to increase enrollment have been to present the opportunities available in PDET to current on campus programs. However, due to the extreme ease in which students can transfer into the PDET program, there is a real opportunity to increase the transfers from various community colleges. To that end, faculty have become involved in the TRENDS conference circuit as a means to increase the visibility of the program. Additionally, steps have been taken by PDET faculty to advise students interested in coming into the PDET program whom are starting their associate degrees at other institutions. In so doing the students are sure to have met all of the entrance requirements by the time they transfer to Ferris.

An increase in the interaction with associate degree programs at various community colleges is necessary to increase enrollment. With only two faculty that are teaching overloads on an annual basis, time to do such specific marketing has been limited.

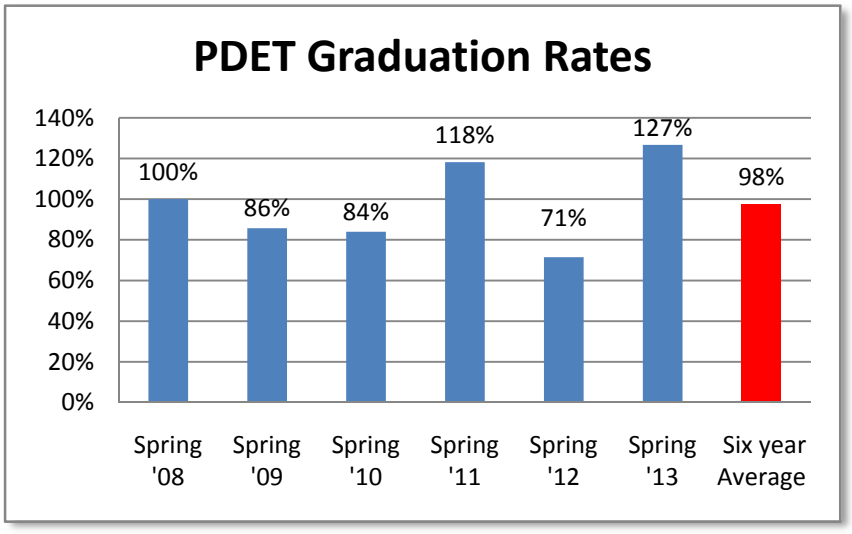
Program faculty are looking at other methods with University Advancement and Marketing to increase visibility of program.

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

In an attempt to provide PDET program specific graduation and retention information with actual validity, data was taken from MyFSU. Enrollment in the PDET Seminar class, PDET 311, which all incoming students must take, was compared to PDET 499, the capstone course, which is generally taken in the final semester by all students. Fall enrollment in PDET 311 was compared to Spring enrollment, two years later in PDET 499. For example, Fall 2006 compared to Spring 2008. As you will see in the chart below, it is not an exact comparison but does give a good idea of both graduation rate and time in the program.

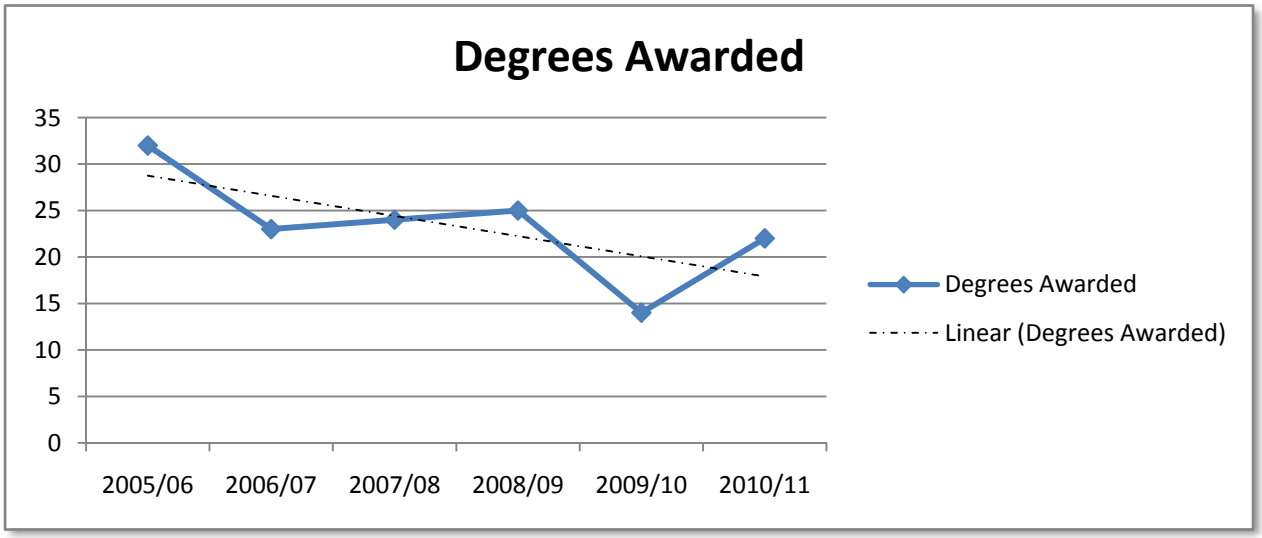


According to the data above, the six year graduation/ retention average is 98%. This translates into a mere 2% of PDET graduates not completing their program of study.

The actual number of students that did not graduate in the allotted two years can be seen in the data below.

Graduating Year	PDET 499	PDET 311 Fall Semester (2 yrs. Prior)	Graduation Rate
Spring '08	13	13	100%
Spring '09	14	12	86%
Spring '10	25	21	84%
Spring '11	11	13	118%
Spring '12	21	15	71%
Spring '13	15	19	127%
Six year Average			98%

The number of degrees awarded according to IR&T can be seen in the chart below. The data includes both on-campus and off-campus students.



Retention information was not readily available at the program level. 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) were unsuccessful.

A study done in the 2006 APR cycle was a compilation of 13 years of SIS data from 1993 through 2006 that was manually extracted and analyzed by Professor Rich Goosen. No data is readily available that compares to this study. According to the data, 86.9 % of enrolled students graduate from the program. Of those 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 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. For a complete analysis please reference the 2006 APR for Product Design Engineering Technology.

Although the study of 2006 was not duplicated for this cycle, preliminary numbers indicate there has been no significant change in the length of time to graduate or the graduation rate from 2006.

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 no significant change in the program curriculum since the last Academic Program Review in 2006.

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 2012

PDET	CH	Lec	Lab	Other COT	CH	Lec	Lab	Non-COT gen ed	CH	Lec	Lab	Non-COT other	CH	Lec	Lab
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	GEOG100	3	3	0	MATH216	4	4	0
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					SA200+	3	3	0	COMM336	3	3	0
PDET422	4	3	3					CE200+	3	3	0				
TOTALS	**25**	**20**	**14**		**15**	**14**	**2**		**18**	**17**	**3**		**7**	**7**	**0**
%	38%	34%	74%		23%	24%	11%		28%	29%	16%		11%	12%	0%
PROGRAM TOTALS	**65**	**58**	**19**					**TOTAL non-COT**	**25 38%**	**24 41%**	**3 16%**				

As can be seen in the chart above, the Product Design Engineering Technology program has a very good balance of course requirements across many disciplines. The field of Design Engineering can encompass many different fields and almost every industry. The diversity of courses helps prepare the students by exposing them to many areas of the design process from material selection through design and into manufacturing.

The PDET faculty are continually working to ensure we are producing the type of students needed in industry. As such we look to our Advisory Board on a regular basis. It is the perception of both the faculty and the board members that the students entering the job market from the PDET program are well prepared to handle the demands of the design arena (see section 2-F). As such, no curriculum changes are pending or proposed at this time.

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 C & D of this report. The PDET Industrial Advisory Board has not reviewed actual classroom instruction and therefore has made no assessment of this metric.

One of the most unique aspects of instruction within the Product Design program continues to be 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. 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.

Another successful use of technology has been implemented through the use of a company called Shapeways. Students in the PDET 415 Advanced Modeling class designed a part in CREO (the design software used in PDET) then uploaded the part file to Shapeways.com and had a rapid prototype model made. The models, in most cases were received within two weeks of the initial file submission. The students were given a fifty dollar limit which was paid for by the PDET program. Students could design any size part with any one of the several materials available through Shapeways so long as the combined part volume and material costs were within the fifty dollar limit. The Spring 2013 semester was the first attempt at the use of this technology. It was an excellent way for students to realize how technology can take an idea and turn it into a real tangible part. While this was the first semester of implementation, word spread quickly and many students have expressed excitement about the opportunities to do the same in upcoming sections of PDET 415. It is the intent of the PDET program to make this a regular expenditure in our base line budget for upcoming years.

Each Fall semester students participate in a Junior vs. Senior sporting competition. The event is either softball or bowling. Faculty regularly participate in these events and food is provided afterwards. This has been a good way for students to interact with faculty in a non-professional setting.

Students are also exposed to a several guest lecturers throughout the capstone project course, PDET 499. Speakers range from librarians and advisors from graduate programs to industry professionals. Junior students are also invited to attend the senior presentations which are given in front of the advisory committee. This allows them to see what the presentations are like and interact with the advisory committee.

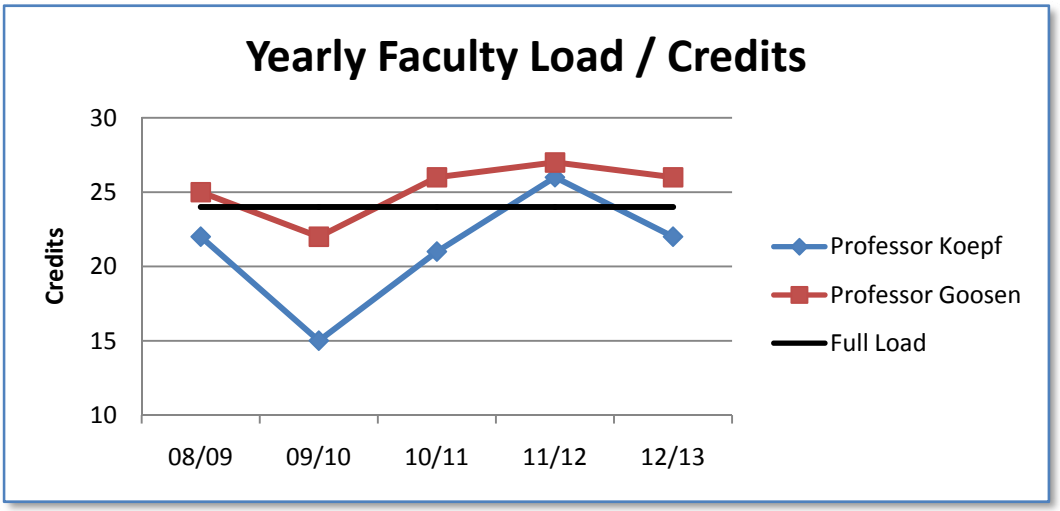
Several students have also participated in the Honors Program at Ferris, though no data was obtained as far as the exact number.

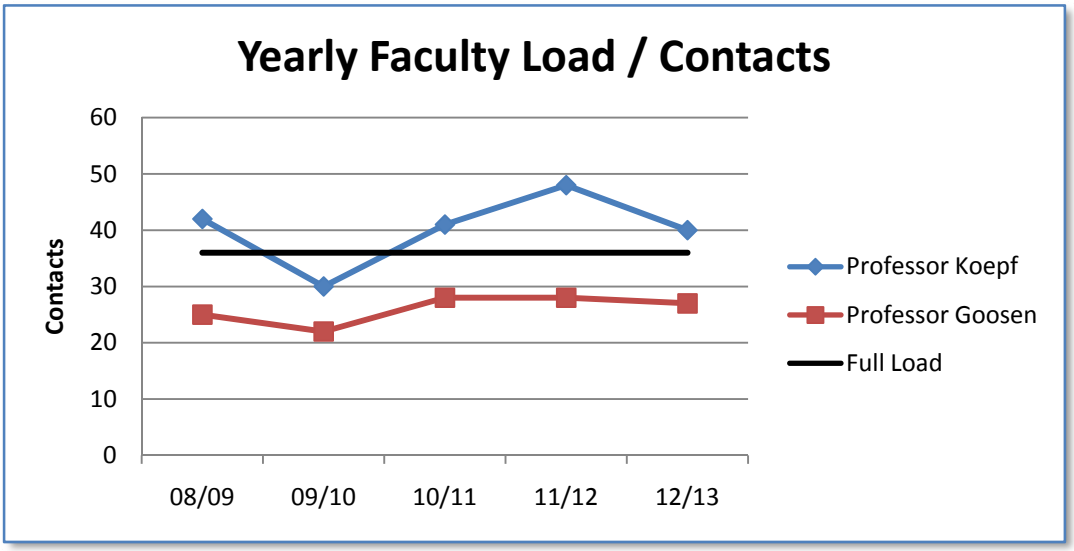
H. COMPOSITION AND QUALITY OF FACULTY.

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 generally

teaches the more analytically based program courses and Associate Professor Koepf teaches all CAD based courses in the program. A recent resume of each faculty member is provided in Appendix A.

Both Professor Goosen and Associate Professor Koepf have accepted overload assignments whenever the need arises. Overloads have been taught by both faculty for four out of the five years being reported. Mr. Koepf teaches the majority of the lab related course work and is therefore overloaded in contact hours. Mr. Goosen tends to teach the majority of the lecture based analytical courses and is therefore overloaded in credits. This balance of course work allows the PDET faculty to teach overload while maintaining a good student to teacher relationship. The charts below show the distribution of credit hours and contact hours by faculty.





It is expected that overloads will continue as enrollment in service courses continues to rise. The initiation of the Design Certificate will also be a factor in the continuing need for the PDET faculty to teach overload assignments.

Since the last program review Professor Goosen has received a Doctor of Philosophy in Higher Educational Leadership from Western Michigan University in 2009. 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). In addition he is a regular participant in the TRENDS conference circuit. In addition, the following FCTL classes/seminars have been attended;

Pod Casting, Copyright and the Creative Commons, Orientation to Ferris Connect, Reading Across the Curriculum and Great Teachers Seminar.

He has also completed the PLTS 220 Medical Devices course.

Since the last program review Associate Professor Koepf has achieved certification as a GD&T Professional, Technologist Level through ASME. In addition he has attended the PTC world Conference and taken several courses in PRO –Engineer/CREO for software updates.

Since the last program review there has been no non-tenure track faculty or adjunct faculty utilized in the Product Design Engineering Technology program.

I. ASSESSMENT AND EVALUATION.

Product Design Engineering Technology program is assessed at both the course and program level. Program level assessment using TRACDAT has been completed each year since 2010. Course level assessment is less uniform but, as a minimum, has been completed for all PDET prefix courses since 2011. It is the practice of the program to focus on the program level outcomes and to use course level assessments for individual course development/improvement by those teaching the course unless the performance of a course is negatively impacting a program level outcome.

Program Level Assessment

The PDET program is assessed using six outcomes. One outcome uses external data from Institutional Research and Testing, one outcome is evaluated by a formal presentation by the student and four outcomes are developed by the evaluation of elements of a formal written report by the student. This formal report, which serves as a portfolio for the student, is completed by documenting the capstone development project required by each graduating PDET student. The project and its report is an individual activity and requires the student to design (including concept development, research, analysis and documentation for manufacturing) a product or significant improvement to an existing product. Each product development project is unique, selected and proposed by the student to the program faculty for approval at the start of

spring semester of the fourth year. An approved project must have adequate content appropriate to the mechanical design focus of the PDET curriculum and must be a new/unique development rather than a duplication of an existing product design. The completed report is typically 100 to 200 pages in length and must be submitted in formal thesis/dissertation format. Coupled with this activity is a formal presentation by the student to the program faculty, the PDET Advisory Board and selected program alumnae currently in an industrial position involving product design.

The five outcomes of the PDET program were initially selected by the PDET program faculty and then submitted for review/modification to the program advisory board in 2012 (see Section 2 – Advisory committee perceptions). This review led to the creation of a sixth program outcome addressing the employability of program graduates. The program outcomes of the PDET program with four years of evaluation are as follows. The TRACDAT report containing this information without analysis (PDET Assessment by Objectives) is included in Appendix C.

Objective 1 - Mechanical Design.

Objective. The student will demonstrate the ability to apply engineering principles in the development of mechanical designs from initial concept through realization suitable for manufacturing.

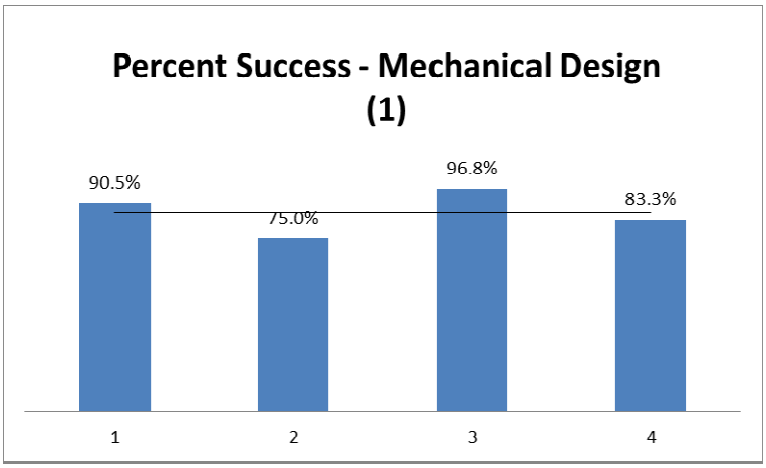
Assessment Method. Capstone evaluation of the mechanical design content of an individual product development as described in a formal written report.

Criteria. Students will achieve a score a score of 70% or better on relevant sections of the capstone report.

Results.

OUTCOME 1	Mechanical Design			
YEAR	**Students**	**# Meeting Criteria**	**Percent Success**	**Class Average**
2010	21	19	90.5%	
2011	12	9	75.0%	83.8%
2012	31	30	96.8%	92.0%
2013	18	15	83.3%	80.1%

Analysis. The results for this outcome with a linear trend line were developed using the Percent Success data providing the following results. Note that 1 = 2010, 2 = 2011, 3 = 2012, 4 = 2013.



This data shows that while each year there is a small number of students that do not meet the success criteria, there is no significant and consistent trend in performance. In addition to a low number of unsuccessful students, the overall class average for this outcome indicates that the performance of graduating students for this outcome is acceptable.

Objective 2 – Computer Aided Design (CAD).

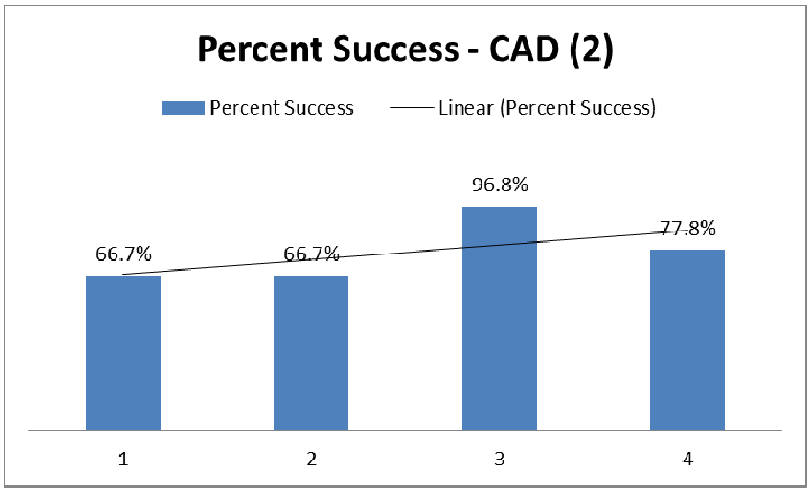
Objective. Students will demonstrate the ability to document mechanical designs using Computer Aided Design (CAD).

Assessment Method. Capstone evaluation of the CAD drawing documentation of an individual product development as presented in a formal written report.
Criteria. Students will achieve a score a score of 70% or better on drawings of a mechanical product prepared using Computer Aided Design

Results.

OUTCOME 2	CAD / Solid Modelling			
YEAR	**Students**	**# Meeting Criteria**	**Percent Success**	**Class Average**
2010	21	14	66.7%	
2011	12	8	66.7%	73.9%
2012	31	30	96.8%	74.8%
2013	18	14	77.8%	75.2%

Analysis. The results for this outcome with a linear trend line were developed using the Percent Success data providing the following results. Note that 1 = 2010, 2 = 2011, 3 = 2012, 4 = 2013.



This data shows that while each year there is a small number of students that do not meet the success criteria, aside from the 2011 class year (96.8%) there is no significant and consistent trend in performance. In addition to a small number of unsuccessful students, the overall class averages for this outcome indicates that the performance of graduating students for this outcome is stable and acceptable.

Objective 3 – Oral Presentation.

Objective. Students will demonstrate the ability to present design concepts and realizations via formal oral presentations.

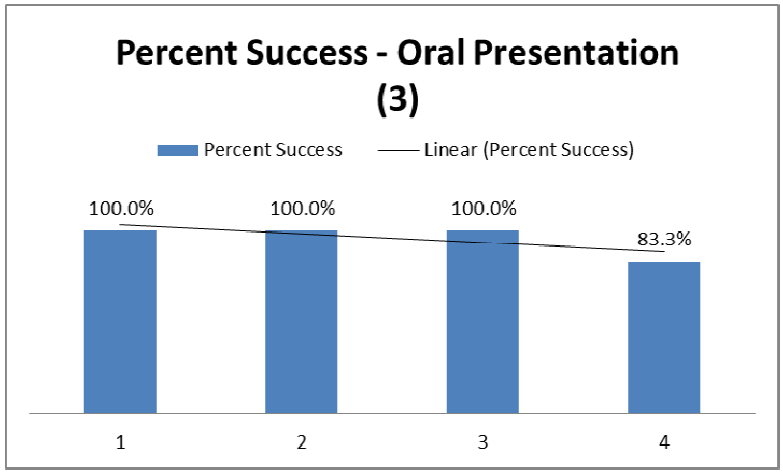
Assessment Method. Capstone evaluation of a formal presentation made to a review board comprised of faculty and engineering professionals.

Criteria. Students will achieve a score a score of 70% or better on a formal oral presentation on their project including the definition of a problem, a description of their design solution, the methods used to develop the design, the analysis supporting the design, a detailed cost analysis of the design and possible improvements to their design using oral presentation.

Results.

OUTCOME 3	Oral Presentation			
YEAR	**Students**	**# Meeting Criteria**	**Percent Success**	**Class Average**
2010	21	21	100.0%	
2011	12	12	100.0%	84.2%
2012	31	31	100.0%	90.3%
2013	18	15	83.3%	84.8%

Analysis. The results for this outcome with a linear trend line were developed using the Percent Success data providing the following results. Note that 1 = 2010, 2 = 2011, 3 = 2012, 4 = 2013.



This data shows that after three years of 100% success, the class of 2013 included three students of 18 that were not successful for this objective. Overall there is no significant and consistent trend in performance. In addition to a low number of unsuccessful students in a single year, the overall class averages for this outcome indicates that the performance of graduating students for this outcome is excellent.

Objective 4 – Written Communication.

Objective. Students will demonstrate the ability to present design concepts and realizations in written form.

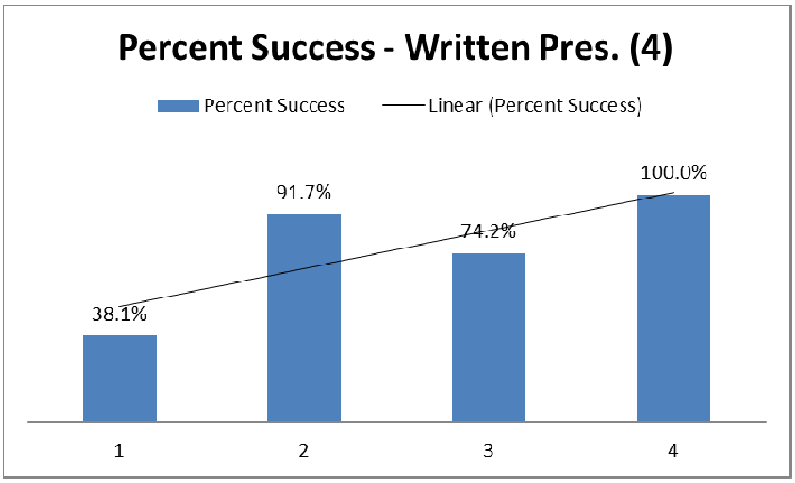
Assessment Method. Capstone evaluation of a formal written report documenting the development of a product.

Criteria. Students will achieve a score a score of 70% or better on the evaluation of the writing skill elements of the capstone written report.

Results.

OUTCOME 4	Written Presentation			
YEAR	**Students**	**# Meeting Criteria**	**Percent Success**	**Class Average**
2010	21	8	38.1%	
2011	12	11	91.7%	84.2%
2012	31	23	74.2%	90.3%
2013	18	18	100.0%	84.8%

Analysis. The results for this outcome with a linear trend line were developed using the Percent Success data providing the following results. Note that 1 = 2010, 2 = 2011, 3 = 2012, 4 = 2013.



This data shows that, with the exception of the 2010 class year (38.1%), the general trend in performance for this outcome is slightly positive. The overall class averages for this outcome indicates that the performance of graduating students for this outcome is acceptable.

Objective 5 – Fundamental Technical Knowledge.

Objective. Students will demonstrate a fundamental knowledge of mathematics, physical sciences and engineering science applicable to the design of mechanical products.

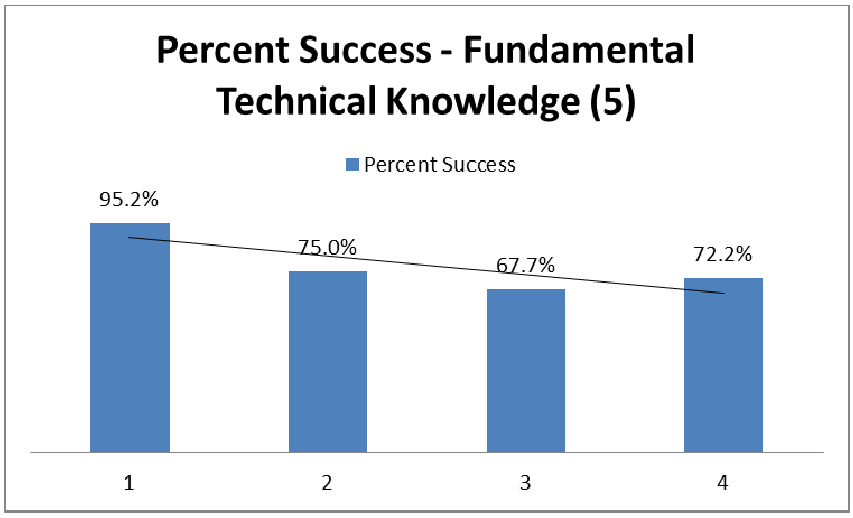
Assessment Method. Evaluation of relevant sections of the capstone project report.

Criteria. Students will achieve a score a score of 70% or better on the relevant sections of the capstone written report.

Results.

OUTCOME 5	Fundamental Technical Knowledge			
YEAR	**Students**	**# Meeting Criteria**	**Percent Success**	**Class Average**
2010	21	20	95.2%	
2011	12	9	75.0%	84.2%
2012	31	21	67.7%	90.3%
2013	18	13	72.2%	84.8%

Analysis. The results for this outcome with a linear trend line were developed using the Percent Success data providing the following results. Note that 1 = 2010, 2 = 2011, 3 = 2012, 4 = 2013.



This data shows that, even with the exception of the 2010 class year (95.2%), the general trend in performance for this outcome is slightly negative. The overall class averages (above 80%) for this outcome indicate that the performance of graduating students for this outcome is acceptable.

Objective 6 – Graduate Employment

Objective. PDET program graduates will be employable at a competitive salary / wage.

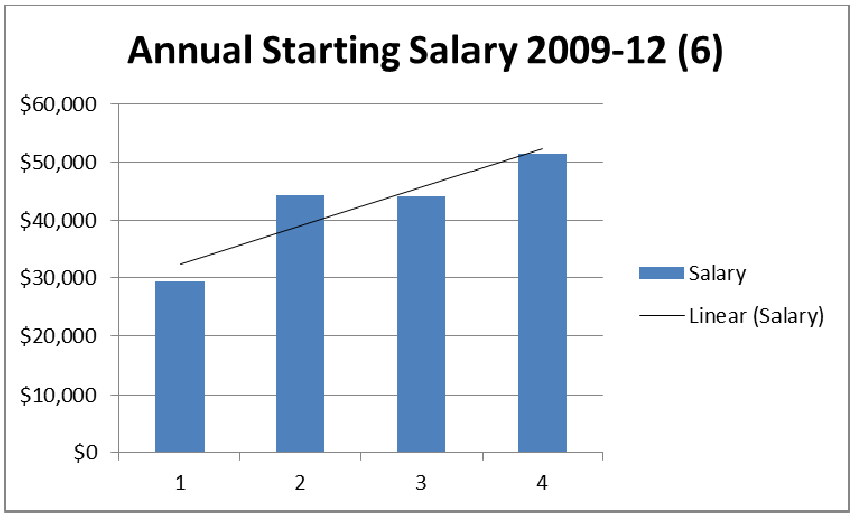
Assessment Method. Assessment will be based on data provided by Career Services / Institutional Research.

Criteria. 80 % of PDET program graduates will be employed within one year of graduation at a wage/ salary at or above the mean compensation level for graduates of the College of Engineering Technology.

Results.

OUTCOME 6	Graduate Employment		
YEAR	**Graduates**	**# Reporting**	**Salary**
2009	24	5	$29,275
2010	25	7	$44,200
2011	14	8	$44,144
2012	22	6	$51,500
2013		Not Available	

Analysis. The results for this outcome with a linear trend line were developed using the Average Starting Salary with the following result. Note that 1 = 2009, 2 = 2010, 3 = 2011, 4 = 2012.



The results were developed from the data provided from 2009 through 2012. Data from 2013 is not yet available. The average starting salary for the College of Engineering Technology graduates is not provided by Institutional Research so an evaluation of this objective per the stated criteria has not been completed. The data shows what appears to be a positive trend in starting salary however this data provided is based on less than a third of the program graduates with the exception of 2011 in which approximately one half of the program graduates reported a starting salary. While the general trend in performance for this outcome appears to be significantly positive, it is based upon an unreliable response level. To validate the Institutional Research data in the future, graduating students beginning in 2013 will be asked to identify their starting salary. The current overall annual starting salary ($51,500) for this outcome indicates that the performance of graduating students for this outcome is acceptable and this value approximates the $51,464 starting salary reported by students graduating in 2013 (see section 2 – Graduating Student Survey).

Course Level Assessment

PDET courses are assessed using course specific outcomes. The single exception to this rule is the senior capstone course (PDET 499) whose five course outcomes also serve as program outcomes. All PDET and required related courses are integrated into the curriculum as reflected in the TRACDAT Curriculum map included in Appendix C. A summary of PDET and required related courses level assessment is provided in the following tables.

PDET Course	Credit Hrs	Outcomes	Methods	Results Available
PDET 311	1	3	3	2010,11,12,13
PDET 312	2	4	4	2011,12
PDET 321	3	3	3	2010,11,12,13
PDET 322	2	3	3	2012,13
PDET 411	3	6	6	2010,11,12,12
PDET 412	2	3	3	2012,13
PDET 413	3	5	5	2010,11,12,13
PDET 415	2	5	5	2012,13
PDET 422	4	3	3	2010,11,12,13
PDET 499	3	6	6	2010,11,12,13

This table shows that all PDET courses (10) have defined outcomes and methods (40). Definition of the 40 course outcomes for PDET courses are provided in Appendix C (PDET Course Outcomes Summary). The table also indicates that, as a minimum, each PDET course has at least two years of assessment results entered into TRACDAT with some courses having as many as four years of data. This summary indicates that TRACDAT assessment is being used in all PDET courses across the 40 course specific outcomes.

Related Course	Credit Hrs	Outcomes	Methods	Results Available
PLTS 342	3	6	6	
ARTS 101	3	12		
CHEM 103	3	6		
COMM 336	3	7		
EEET 201	3	5	5	2010,11,12
ENGL 321	3	6	6	
GEOG 100	3	5		
MATH 216	4	4	4	
MATL 341	3	3	3	
MECH 340	4	4	4	2004,05,06,07,08,09,10,11,12
MFGE 352	2			

This table shows that few required related courses (11) in the PDET curriculum have defined outcomes and methods. Elective general education courses are not shown. All but one course (MFGE 352) have course outcomes but only six of ten courses have a defined methodology for their outcomes. Only two courses (MECH 340 and EEET 201) have any results available. Due the aggregate methodologies used to develop the few results available, however, it is not possible to determine the performance of PDET students taking these courses. This summary indicates that TRACDAT assessment is being used few required related courses.

Limitations of Current Assessment Practice

There are a number of limitations inherent in the current TRACDAT based system of assessment. The most fundamental limitation is the use statistical analysis methods to determine trends based very small numbers of students with a large amount of variation in the student population from year to year. Each PDET class year contains students who have significantly different social and educational backgrounds. While the entrance requirements and PDET curriculum have remained unchanged during the years covered by this review, the students in the PDET program have had a wide range of ages, work experience, academic preparation and maturity. Without a comprehensive objective entrance examination, only the successful completion of prior coursework taken at a variety of schools is used to establish adequate preparation for the program. Within the program there is a significant variation in instruction for most required related courses. For example the students in the class of 2013 completed the ENGL 311/321 upper level writing course from at least six different instructors in a variety of formats (one night a week, two/three classes a week, online). Per the results shown in this review, there is no evidence that any uniform comprehensive assessment is being used in these courses. In the small number of courses (2) where there is evidence of assessment, the TRACDAT system as it is currently used does not allow the performance of PDET students to be isolated from a general class population. Even with the PDET courses, all of which have established outcomes and active assessment, there can be a wide variation between the year to year performance of students being taught the same class content by the same instructor.

The limitations in current assessment practice and the large variation in student populations require that only data created over a long period of time be used as a basis for curriculum decisions. For the PDET program, with approximately 20 students per class year, a five year period of time should be used to determine performance trends. Even with a long evaluation period, only the most significant and consistent trends should merit comprehensive curriculum changes. The same need to use long term evaluations as a basis of decision also limits the ability to promptly see the effects of any changes made. Response results may take years to become visible and then can be easily masked by the amount of variation in the student population and/or the learning environment outside of PDET course content. Making excessively responsive changes to curriculum, individual course content and/or instructional practice based on the latest yearly TRACDAT data is a meaningless waste of resources with potentially negative consequences.

Use of Assessment Results

PDET assessment activities are program focused. PDET program assessment activities began with the definition of five program outcomes in 2009. Due to the limitations discussed in this review, it was the decision of the program faculty to accumulate three years of program level assessment results before attempting any evaluation activity. In 2012, using the results of class years 2010, 2011 and 2012, the first review of program level assessment were made by the PDET faculty and presented to the program Advisory

Board (see PDET Assessment Summary June 2012, Section 2). It was the conclusion of both the faculty and the board that the available data from the previous three years did not indicate a need for changes in the PDET curriculum although continued monitoring was recommended. In addition, the PDET Advisory Board indicated that all of the program level outcomes being used were appropriate for the measuring the level of preparation of program graduates for entering the mechanical design profession. It was recommended by the Advisory Board that an evaluation of employability of graduates be added as a program outcome. The led to the creation of a sixth program level outcome evaluating annual starting salary. It was the consensus of the Advisory Board that the annual starting salary of PDET graduates could provide an effective means to evaluate the value of the degree in the work place and that the program should be expected to establish that its graduates are employed with a compensation level commensurate with the cost of the degree.

In response to a continuous process of program self-assessment by the PDET program since its inception, a number of changes have been made to the courses within the PDET curriculum. These changes have been developed and implemented both before and after the implementation of the TRACDAT assessment process. A sample of the more prominent changes implemented are as follows;

1. The PDET laptop initiative. In 2000 the PDET program became the first program to require that its students obtain and use an individual laptop personal computer in PDET classes. This change required the program faculty to establish the viability of the use of laptop computers for demanding solid modeling CAD software and to coordinate a practical licensing arrangement for the required software. This change has enabled each PDET student to develop critical skills and to increase their value to potential employers without the limitations of scheduled computer laboratory time.
2. For at least the last five years the PDET course in advanced solid modeling (PDET 415) has program has included a major design team activity that requires students to design a subsystem for an instructor provided automobile chassis. This was added to increase student involvement with a focus on a project interesting to the Automotive Engineering students taking the course as a related technical course. This change has significantly increased the level of student satisfaction in the course.
3. In 2013, a rapid prototyping activity was added to the PDET curriculum in which each student was offered the opportunity to use an outside fabrication source to develop a physical implementation of one of their solid models developed in class. Even though participation in this activity has been voluntary, virtually all students have elected to participate and have gained a valuable practical experience useful for future employment.
4. In response to the procrastination that many students experience in the capstone design experience, periodic design reviews were added to the course requirements. These reviews, similar to those typical of industry, require each student to review the status of their project with the program faculty. This change has reduced the level of procrastination among the students taking the course

and has increased the level of student satisfaction and the overall quality of the formal technical reports.

5. In the fall of 2013, a lecture – recitation class format was implemented in the Thermodynamics and Fluid Power course (PDET 413). This change, which mirrors the common lecture - laboratory format used in the College of Engineering Technology, has a large lecture section with smaller more individualized recitation sessions used to demonstrate problem solutions and to encourage student interaction. This change has reduced the contact hours required to serve a large number of students while still maintaining close student contact in the recitation sessions.

None of the changes described were implemented in response to TRACDAT assessment activity and none of these changes resulted in a corresponding change in course outcome performance to the level necessary to be detectable in short term TRACDAT results. At best, the utility of TRACDAT in monitoring the results of course level changes is to verify that a change has not had an obvious negative effect on student performance. For example, of the five outcomes of PDET 415 for fall 2013 (see #5), three outcomes showed improved student success and two outcomes exhibited negative impact. The overall impact in the percentage of student success however showed a slight (3.5%) decrease in performance across the five outcomes. Both results were within the range of variation exhibited by the course outcomes during the prior three years. This indicates an inconclusive result as measured by TRACDAT results and supports the idea that most changes in student performance are difficult to detect and require multiple years to evaluate.

J. SERVICE TO NON-MAJORS.

The PDET faculty frequently teaches MECH prefix courses as part of their assigned loading. Also, PDET 122 was created for the Tooling Technology program. This course is an entry level modeling course using CATIA software design to give the students the skills required for more advanced courses in the program. It was developed and modified several times through discussion and collaboration with faculty from both PDET and MFGT. The result is a course that provides students with the specific skills sets required to be successful in the Tooling Technology program. A summary of these courses as well as a number of courses offered as electives to other College of Technology programs is as follows;

Course	Required By	Elective For	First Offered
PDET 312	PDET	AUTO, MECH	Fall 1993
PDET 412	PDET	AUTO, MECH	Fall1993
PDET 413	PDET	AUTO, EEET	Fall 1993
PDET 322 (laptop)	PDET	MECH etal	Winter 2001
PDET 415 (laptop)	PDET	MECH etal	Fall 2002
PDET 415 (computer lab)	AUTO	MECH etal	Winter 2006
PDET 122	MFGT	none	Fall 2006

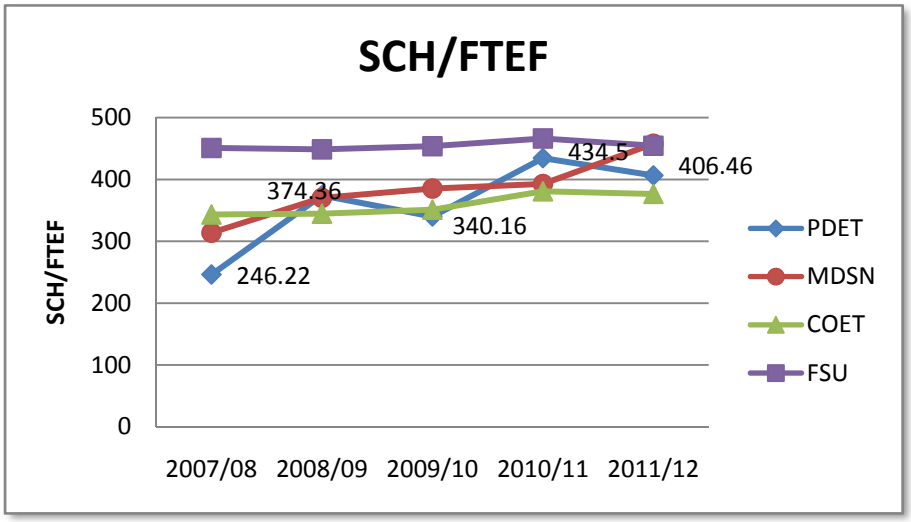
It is the intent of the PDET faculty to continue to seek out the opportunity to provide service classes in PDET specialty areas to any and all programs that can identify a need and that can provide a productive number of students.

PDET faculty has also developed a Design Certificate, which is comprised of four courses, PDET312, PDET 412, PDET 322, and PDET 415. This certificate was created in response to feedback from students, primarily in the AUTO program requesting additional credentials in the design arena. Statistical data is not yet available as the Design Certificate is just entering its second year of availability. It should be noted however that the courses included in the certificate have seen a definite increase in enrollment. The Fall 2013 semester shows multiple sections required for PDET322, a section of PDET415 added for AUTO students, and an overflow of 5 students in PDET 312. The checklist for the Design Certificate is shown below.

Required Courses		Credits	Prerequisites	Semester	GR	TR
PDET 312	Advanced Tolerancing	2	None	Fall		
PDET 412	Statistics/Ergonomics	2	None	Spring		
PDET 322*	Model and Prototype	2	None	Fall or Spring		
PDET 415**	Advanced Solid Modeling	2	PDET 322	Fall or Spring		
	Total Credits	8				

It should be noted that the 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.

K. DEGREE PROGRAM COST AND PRODUCTIVITY DATA.



As can be seen in the graph above, productivity for PDET faculty has shown a definite upward trend over the past 5 years. This trend is attributed to two main factors. The first being several PDET courses being adopted as core requirements by other programs. The most significant being PDET 322, PDET 415, and PDET 413 which are required by the Automotive curriculum. This requirement was a direct result of the Automotive Engineering Technology Programs ABET accreditation which required them to include design content as part of their core offering. The second is the development of the Design Certificate. The certificate is only in its second semester of official offering but the courses included have already seen an increase in the number of non-PDET students enrolled.

L. ADMINISTRATION EFFECTIVENESS

The Product Design Engineering Technology (PDET) program tends to run with very little influence from administrative actions. However, there has been one significant negative impact due to administrative direction. That has been the fact that the PDET program has switched schools within the College of Engineering technology several times over the past 5 years. This makes it very difficult to obtain data from the general university reports as the program data will get split into different areas.

Clerical support for the program has been very good. Sandy Kerridge and Lisa Knudson share duties and have done a great job in supporting the program. They currently have responsibility for six different programs. The only down side is the lack of visibility and the ability for students to readily find the office for PDET.

All class schedules are set up by the faculty with help from the program secretary in an efficient and effective manner. The block schedules for core classes remain largely unchanged in an effort to aid the students in getting the required courses.

Section 4: Facilities and equipment

A. INSTRUCTIONAL ENVIRONMENT

Currently, most Product Design courses (PDET prefix) having lecture content are taught in Swan 301A, excluding sections of the parametric modeling and advanced parametric modeling courses designated for the Design Certificate which are taught in the SWN 105A computer lab.

Room 301A has received 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. However, the lighting was not done to the specifications requested by the Product Design faculty per advisory board recommendations. The lights in the front of the room cannot be turned off to facilitate viewing of the overhead projector which is heavily utilized in many courses, especially those using the parametric design software. This is due to the banking configuration of the lights.

In addition, the room upgrades did nothing for the overall appearance of the classroom, which is still reminiscent of the 1970's décor. A large 'buss' duct was also added which runs right through the center of the room, further adding to its "utility room" appearance. The Product Design Engineering technology program is the only program of its kind in the nation. This fact coupled with the largest College of Engineering Technology in the nation warrants a classroom that is more reflective of a modern design studio which could be used as a showcase in attracting more students.

Another deficiency with the existing 301A classroom is environmental, as reported in the previous two APR reports. 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.

Additionally, the lack of available studio space for PDET students to use when fabricating the prototypes required for program classes has also been identified in previous reviews and by the Industrial Advisory Board. 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 SWN 301A classroom. Space adequate to provide each 4th year student with an individual 4' x 4' area appears to be available at several locations within the Swan building and throughout campus.

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 standalone 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.

B. COMPUTER ACCESS AND AVAILABILITY

As stated in section 3-G, since 2001, students entering into the Product Design Engineering Technology program are required to have access to their own laptop computer. These computers are the sole responsibility of the students to maintain and update. Critical CAD software in the form of CREO, a parametric modeling software used for the 3-dimensional design of mechanical components, is provided at no cost to the students through an innovative time-limited licensing agreement with PTC, the provider of the software. Costs for this license agreement are covered by the PDET program. There are no restrictions placed on the size, model or brand of laptop that can be used. Since 2001 almost every make and model of notebook computer has been seen in the program with very few issues that have not been resolved by the students.

It should be noted that no University resources have ever been assigned to maintain or update these laptops. In the event that a student damages either their hardware or software, the PDET program has purchased three backup laptops. Should the need arise for them to send their system out for repairs, one of the backup units are assigned to the student until such time that the repairs are completed.
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.

The conversion of SWN 301a into a multi-use room also occurred through the purchase of tables with power outlets. This renovation, along with the laptop initiative has allowed the PDET program to run independently, using little to no resources from the Technology Assistance Center or the BTC (Business Technology Consortium).

In addition, the PDET program also provides courses to other majors that do not have a laptop initiative. As such, many sections of PDET 322 and PDET 415, the two parametric modeling courses, are taught in the computer lab located in Swan 105A. The systems in this room are in dire need of replacement. The lab is used by multiple programs including but not limited to; MECH, PDET, MFGT, and MFGE. The lab is also one of the few “open” labs where students can come in and use the systems whenever they are

available. This leads to very high demands on the systems due to the number of programs they are expected to run. In any given semester the lab is usually running at about 80% operability due to systems being down. This is through no fault of the computer technicians from TAC. They do their best with the technology that is there. As the largest College of Engineering Technology in the nation, this is unacceptable. It would be in the best interest of our program, College, and University to make this lab a showcase of technology, rather than a museum of old relic computers that were handed down from another location on campus many years ago.

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 has 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 availability. PDET program faculty have made the FLITE staff aware of this difficulty and various solutions are being considered.

Section 5: Conclusions and Recommendations

A. RELATIONSHIP TO 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.

B. 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 Engineering 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 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.

C. 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 Engineering 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 elimination of computer

laboratory requirements has effectively removed the need for associated support requirements of the program for the last six years while providing a high level of student satisfaction. The addition of requirements like the Shapeways rapid prototype project shows the continued advancement of the use of new technology in the program. The soon to be implemented "E-learning" library from PTC, the makers of CREO, the parametric modeling software used in the program is another example of the use of innovative technology This will allow students to upload there models and get instant feedback on their attempts to properly model mechanical components.

Program graduation rates are exceptional in that on average, 98% of students entering the program graduate and do so in a timely manner. 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 Engineering Technology and the university. In addition, several of the PDET courses are now either required or used as electives by several other programs within the college.

Perhaps the greatest value of the program is to the students looking to enter into the design engineering field. The Product Design Engineering Technology program has always had an extremely high rate of job placement in a multitude of industries. Design is not specific to one area. As such students can find employment in any number of industries that they may have interest. This flexibility and the excellent starting salaries continues to be one of the programs best attributes.

D. 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. Despite these overlaps, the enrollment appears to be stabilizing somewhat. With only two faculty, both of which teach overload assignments annually, until there is a way to get program specific marketing help, the numbers in the PDET program will continue to struggle.

E. CHARACTERISTICS, QUALITY AND EMPLOYABILITY OF STUDENTS

Perhaps the greatest value of the program is to the students looking to enter into the design engineering field. The Product Design Engineering Technology program has always had an extremely high rate of job placement in a multitude of industries. Design is not specific to one area. As such students can find employment in any number of industries that they may have interest. Giving the students the skills required by industry and the flexibility to enter any industry as a designer continues to be one of the programs best attributes.

The degree also has proven value among potential employers with graduates reporting the 9th highest average starting salary of all College of Engineering Technology programs and 13th highest of all university degree according to the Career Services Graduate Follow Up survey.

F. 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 the rapid prototype project, the soon to be implemented "e-learning" solid modeling verification and continuing to upgrade the solid modeling software to the latest version 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.

G. 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.

APPENDIX A

Resume's

Resume – William A. Koepf

Resume – Richard F. Goosen

William A. Koepf

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

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*

EMPLOYMENT EXPERIENCE:

May 2006 – Present

Design Engineering Consultant
Precision Aerospace – GD&T Consultant
Americam – GD&T Consultant
Intrepid Plastics – Quality Engineer

August 2000 - Present

Ferris State University
Professor, Product Design Engineering Technology
Instructional Topics:
*CREO 3-D Modeling and Prototype
*Finite Element Analysis using CREO Simulate
*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.

William A. Koepf

EMPLOYMENT EXPERIENCE (cont.):

September 1997 -March 1998

BSI (Croswell), A Division of Huron Plastics Group

Project Engineer:

* 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.

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 prototype and production tools and served as the customer liaison for all tooling Issues.

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.

Richard F. Goosen PE PhD
Professor
Product Design Engineering Technology
College of Engineering
Ferris State University
Big Rapids, MI 49307 - 2291
(616) 550 - 1951

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 Educational Leadership, 2009

Professional Experience

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

1993 to Present	Professor (2004 - Present), Associate Professor (1999-2004), Assistant Professor (1993-1999) - 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. Recruited, admitted and advised all program students (in Big Rapids and in Grand Rapids) since 1995. Performed or served in a primary role for supporting program activities such as curriculum planning and Academic Program Reviews, student awards and Industrial Advisory Board meetings. In 2001 pioneered the first student owned notebook computer initiative at the university for all program students. This initiative provided greater flexibility for instructional delivery, reduced capital costs and improved student learning outcomes.
2009 to Present	Coordinator for Product Design Engineering Technology and CAD Drafting Tool Design programs. In addition to teaching responsibilities, provided administrative program support for assigned programs. Activites included class scheduling, faculty load planning, admission support activities, assessment coordination and articulation agreement management.
2003 to 2008	Chairman Mechanical Design Department. In addition to teaching responsibilities, provided administrative program support for Mechanical Engineering Technology, Product Design Engineering Technology and CAD Drafting Tool Design programs. Activities included class scheduling, faculty load planning, admission support activities, facility planning and articulation agreement management.

Experience with **Rapistan Demag**, (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. Assigned organization included 45-50 staff and produced $10-15 million in annual sales. 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. Assigned organization consisted of 15 - 20 engineers.

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 design engineering and installed product support in addition to the development of training materials. Assigned technical staff of 4 engineers and technicians

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 (1LT RA) 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 - 1995 **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)**

APPENDIX B

Supporting information for Section 2 – Collection of Perceptions

Section 2 A

Section 2 B

Section 2 C&D

PDET Student Survey, Spring 2008 (B-20 & 21)

PDET Student Survey, Spring 2010 (B-22 & 23)

PDET Student Survey, Spring 2012 (B-22 & 23)

PDET Student Survey, Spring 2013 (B-22 & 23)

CET Graduating Student Survey Spring 2012

Student Survey Responses 2007 - 2013

Section 2 F

Advisory Board Survey Fall 2005 (B-24 through B-27)

Advisory Board Meeting Notes – 9/23/05 (B-28 through B-30)

Y – PDET SENIORS 2008

ɔciates Degree background (circle); ASMET ASTD Other FSU AS Non-FSU

es make up the standard PDET program.

Winter 3rd year	Fall 4rd year	Winter 4th year
PDET 321 Dynamics	PDET 411 Machine Design	PDET 499 Senior Project
PDET 322 ProE	PDET 412 Ergonomics	PDET 422 FEA –MECHANI(
MFGE 352 Design for Mfg	PDET 413 Thermodynamics	
PLTS 342 Plastics	MATL341 Metals	COMM 336 Presentations
MATH 216 Applied Calc.	PDET 415 Adv. PRO E	Social Awareness 200+
PSYC 150 Psychology	ENGL 321 Adv. English	CE 200+elective

/ou take for the 200+ Cultural Enrichment elective _____

ımend this course for future PDET students YES NO

/hat are the most difficult courses in the PDET program (you can include any courses taken as t

did you learn the most?

did you learn the least?

d you enjoy the most?

vhat is (are) the best course(s) overall in the program?

vhat is (are) the worst course(s) overall in the program?

PLEASE TURN OVER AND COMPLETE THE BACK

\TISFIED ARE YOU WITH YOUR ACADEMIC ADVISING

4	3	2	1
	Moderately Satisfied		Not Satisfied

\TISFIED ARE YOU WITH YOUR EDUCATION IN THE PDET PROGRAM

4	3	2	1
	Moderately Satisfied		Not Satisfied

ion is a major aspect of the PDET Program. Please evaluate the way this years final p

NEEDS IMPROVEMENT (please describe a problem area and how you would

to have a laptop computer. Many of the lessons learned in implementing the laptops w
ny of the procedures and policies associated with this requirement.

it is a good idea for the PDET Program to continue to use the PRO ENGINEER SOF

having PRO ENGINEER SOFTWARE experience will help you get a job? YES

that PDET classes using student owned laptop PCs are:

2	3	4	5
			A bad idea

y comments or recommendations about any aspect of the PDET program in the space

Y – PDET SENIORS 2010

- PDET background (circle); MET CDTD Other FSU

Transfer from _____

ses make up the standard PDET program.

	Winter 3rd year	Fall 4rd year	Winter 4th year
	PDET 321 Dynamics	PDET 411 Machine Design	PDET 499 Senior Project
	PDET 322 ProE	PDET 412 Ergonomics	PDET 422 Advanced M. Desi
	MFGE 352 Design for Mfg	PDET 413 Thermodynamics	
	PLTS 342 Plastics	MATL341 Metals	COMM 336 Presentations
	MATH 216 Applied Calc.	PDET 415 Adv. PRO E	Social Awareness 200+
	GEOG 100 World Geography	ENGL 321 Adv. English	CE 200+elective

what are the most difficult courses in the PDET program (you can include any courses taken as t

s) did you learn the most?

s) did you learn the least?

did you enjoy the most?

what is (are) the best course(s) overall in the program?

what is (are) the worst course(s) overall in the program?

ge one thing about the PDET program, what would it be?

(PLEASE TURN OVER AND COMPLETE THE BACK)

ISFIED ARE YOU WITH YOUR ACADEMIC ADVISING

4	3	2	1
	Moderately Satisfied		Not Satisfied

ΓISFIED ARE YOU WITH YOUR EDUCATION IN THE PDET PROGRAM

4	3	2	1
	Moderately Satisfied		Not Satisfied

›ur current employment situation;

eptable job offer — Have job offer(s) but none that are

b search but no offers to date — Have not seriously started a job se

: is a good idea for the PDET Program to continue to use the PRO ENGINEER SO

were to use a different Solid Modeling Software, what would you recommend?

:d to have a laptop computer. Overall do you think that PDET classes using student
same classes in a computer lab) are:

2	3	4	5
			A bad idea

ld any comments or recommendations about any aspect of the PDET program

Y – PDET SENIORS 2012

- PDET background (circle); MET CDTD Other FSU

Transfer from _____

es make up the standard PDET program.

Winter 3rd year	Fall 4rd year	Winter 4th year
PDET 321 Dynamics	PDET 411 Machine Design	PDET 499 Senior Project
PDET 322 ProE	PDET 412 Ergonomics	PDET 422 Advanced M. Desi
MFGE 352 Design for Mfg	PDET 413 Thermodynamics	
PLTS 342 Plastics	MATL341 Metals	COMM 336 Presentations
MATH 216 Applied Calc.	PDET 415 Adv. PRO E	Social Awareness 200+
GEOG 100 World Geography	ENGL 321 Adv. English	CE 200+elective

hat are the most difficult courses in the PDET program (you can include any courses taken as t

) did you learn the most?

) did you learn the least?

did you enjoy the most?

what is (are) the best course(s) overall in the program?

what is (are) the worst course(s) overall in the program?

ge one thing about the PDET program, what would it be?

(PLEASE TURN OVER AND COMPLETE THE BACK)

ED ARE YOU WITH YOUR ACADEMIC ADVISING

3 Moderately Satisfied	2	1 Not Satis

IED ARE YOU WITH YOUR EDUCATION IN THE PDET PROGR.

3 Moderately Satisfied	2	1 Not Satis

ırrent employment situation;

ole job offer Have job offer(s) but none

ırch but no offers to date Have not seriously started

l to have a laptop computer. Overall do you think that PDET classes us
classes in a computer lab) are:

3	4	5 A bad idea

y comments or recommendations about any aspect of the PDET p

Y – PDET SENIORS 2013

- PDET background (circle); MET CDTD Other FSU

Transfer from _____

ses make up the standard PDET program.

Winter 3rd year	Fall 4rd year	Winter 4th year
PDET 321 Dynamics	PDET 411 Machine Design	PDET 499 Senior Project
PDET 322 ProE	PDET 412 Ergonomics	PDET 422 Advanced M. Desi
MFGE 352 Design for Mfg	PDET 413 Thermodynamics	
PLTS 342 Plastics	MATL341 Metals	COMM 336 Presentations
MATH 216 Applied Calc.	PDET 415 Adv. PRO E	Social Awareness 200+
GEOG 100 World Geography	ENGL 321 Adv. English	CE 200+elective

what are the most difficult courses in the PDET program (you can include any courses taken as t

s) did you learn the most?

s) did you learn the least?

did you enjoy the most?

what is (are) the best course(s) overall in the program?

what is (are) the worst course(s) overall in the program?

ge one thing about the PDET program, what would it be?

(PLEASE TURN OVER AND COMPLETE THE BACK)

ΓISFIED ARE YOU WITH YOUR ACADEMIC ADVISING

4	3	2	1
	Moderately Satisfied		Not Satisfied

ΛTISFIED ARE YOU WITH YOUR EDUCATION IN THE PDET PROGRAM

4	3	2	1
	Moderately Satisfied		Not Satisfied

/our current employment situation;

1 acceptable job offer ___Have job offer(s) but none that

ny job search but no offers to date ___Have not seriously started a job

job offer, what is the highest starting salary being offered _____

ı of a 4 year Product Design degree is being considered. This would add two years of
d year of PDET to be taken during the first and second year on campus. The current 3
nchanged. How do you feel about this idea?

2	3	4	5
			A bad idea

rs of a 4 year Product Design Program result in a 2 year AS degree YES

ıdd any comments or recommendations about any aspect of the PDET program i

12Sp CET Grad...BS Product Design Eng Tech Frequencies

Prepared by: Institutional Research & Testing, 06/12

Statistics

	N				
	Valid	Missing	Mean	Median	Std. Deviation
q15 I entered Ferris	9	0	1.56	1.00	.726
q15a Other specified	9	0			
q16 Other degrees earned before coming to Ferris	9	0			
q17 Last high school/college attended prior to Ferris	9	0			
q18_1 Learn: HS teacher/Counselor	9	0	.22	.00	.441
q18_2 Learn: Voc/Tech school teacher/Counselor	9	0	.00	.00	.000
q18_3 Learn: While attending another program at FSU	9	0	.00	.00	.000
q18_4 Learn: From advisor at another college	9	0	.11	.00	.333
q18_5 Learn: From visit by FSU faculty at other college	9	0	.00	.00	.000
q18_6 Learn: General marketing, bill boards, etc.	9	0	.22	.00	.441
q18_7 Learn: Site tour of high school students	9	0	.00	.00	.000
q18_8 Learn: Other	9	0	.56	1.00	.527
q18a Other specified	9	0			
q19 Which Ferris program did you transfer from	9	0			
q20 Why did you switch programs	9	0			
q21_1 Format: On-line	9	0	.11	.00	.333
q21_2 Format: Main campus (face-to-face)	9	0	.67	1.00	.500
q21_3 Format: Off-campus (face-to-face)	9	0	.33	.00	.500
q21_4 Format: Non-Ferris face-to-face	9	0	.00	.00	.000
q21_5 Format: Non-Ferris on-line	9	0	.00	.00	.000
q22 Format do you prefer	9	0	1.00	1.00	.000
q23 Why you prefer that format	9	0			
q24 When did you first start at Ferris	9	0			
q25a Appropriate mastery of the techniques, skills, and tools	9	0	4.44	4.00	.527
q25b Good critical thinking, problem solving & decision making skills	9	0	4.78	5.00	.441
q25c Strong technical understanding of my field	9	0	4.56	5.00	.527
q25d Ability to apply technical theory to practical situations	9	0	4.44	5.00	.726
q25e Self-motivation & enthusiasm for my chosen profession	9	0	4.33	5.00	1.000
q25f Oral & writing skills necessary to communicate effectively	9	0	4.33	4.00	.707
q25g Prepared and able to assume responsibility	9	0	4.44	5.00	.726

Statistics

	N				
	Valid	Missing	Mean	Median	Std. Deviation
q25h Provided adequate social awareness courses	9	0	4.44	5.00	.726
q25i Effectively used available resources from my program	9	0	4.44	5.00	.882
q25j Worked well with individuals with diverse backgrounds	9	0	4.44	5.00	.726
q25k Commitment to quality, timeliness, continuous improvement	9	0	4.56	5.00	.527
q25l Good ethical values	9	0	4.56	5.00	.726
q25m Challenged intellectually by my courses	9	0	4.44	5.00	.726
q25n Motivated to a higher level of performance	9	0	4.56	5.00	.527
q25o Design and conduct experiments, as well as to analyze and interpret data	0	9			
q25p Design a system, component, or process to meet desired needs within realistic constraints	0	9			
q25q Broad education necessary to understand the impact of technical/engineering solutions	0	9			
q25r Function effectively on (multidisciplinary) teams	9	0	4.56	5.00	.726
q25s Identify, formulate, analyze and solve technical or engineering problems	9	0	4.56	5.00	.527
q25t Recognized the need for life-long learning	8	1	4.25	4.00	.707
q25u Understand professional, ethical and social responsibilities	9	0	4.33	4.00	.500
q25v Apply current knowledge and adapt to emerging applications	9	0	4.00	4.00	.707
q25w Conduct, analyze and interpret experiments, and apply experimental results	9	0	4.11	4.00	1.054
q25x Apply creativity in the design of systems, components, or processes	8	1	4.63	5.00	.518
q25y Respect for diversity and knowledge of contemporary professional, societal and global issues	9	0	4.11	4.00	.782
q25z Provided a good mix of courses for my career options	9	0	4.11	4.00	.928
q25aa Provided adequate technical content courses by my program	9	0	4.33	5.00	.866
q26a Overall mastery of subject matter	9	0	3.56	4.00	.527
q26b Adequate instruction in the classroom	9	0	3.56	4.00	.527
q26c Involved in my education process inside the classroom	9	0	3.56	4.00	.527

Statistics

	N				
	Valid	Missing	Mean	Median	Std. Deviation
q26d Involved in my education process outside the classroom	9	0	3.44	4.00	.726
q26e Accessible for advising	9	0	3.67	4.00	.500
q26f Helpful in advising	9	0	3.67	4.00	.500
q27a Curriculum is current for my industry/profession	9	0	3.78	4.00	.441
q27b Overall quality of the labs & hands-on components were relevant	9	0	3.56	4.00	.527
q27c Rate the quality of my curriculum as good	9	0	3.67	4.00	.500
q28 Required an internship experience	9	0	1.78	2.00	.441
q29 The internship experience was an important aspect	2	7	1.00	1.00	.000
q30a Classrooms provide a good learning environment	9	0	3.22	3.00	.972
q30b Equipment & supplies were available and maintained	9	0	3.22	3.00	.667
q30c Lab equipment was representative	9	0	3.33	3.00	.500
q30d Instructional lab facilities were in good condition	9	0	3.44	3.00	.527
q31a Experiences other than coursework were valuable part of my education	9	0	3.11	4.00	1.364
q31b Guest speakers were a valuable part of my education	9	0	2.89	3.00	1.054
q31c Adequate learning resources were available	9	0	3.33	3.00	.500
q31d My overall campus experience was satisfying	9	0	3.67	4.00	.500
q31e I would recommend my program to others	9	0	3.67	4.00	.707
q31f I would be interested in working to advance my program at FSU	9	0	2.67	3.00	1.000
q31g Overall, I am very satisfied with my education at FSU	9	0	3.78	4.00	.441
q32 Overall campus experience was satisfying (why/why not)	9	0			
q33 Recommend your program to others (why/why not)	9	0			
q34 I was a student member of at least one industry/professional organization	9	0	1.89	2.00	.601
q35 Do you believe your membership helpful	2	7	1.50	1.50	.707
q36 I participated in other campus/community organizations	9	0	2.00	2.00	.500
q37 I served in a leadership position for a student or industry/professional organization	2	7	2.00	2.00	.000

Statistics

	N				
	Valid	Missing	Mean	Median	Std. Deviation
q38 Do you believe your leadership position helpful	0	9			
q39 Were you made aware of and apply for scholarship opportunities	9	0	1.33	1.00	.707
q40a Study Abroad	9	0	1.67	2.00	.500
q40b Internship Abroad	9	0	1.78	2.00	.441
q40c I did participate in the Internship Abroad program	9	0	2.00	2.00	.000
q41_1 Limited: Funding	9	0	.56	1.00	.527
q41_2 Limited: Time	9	0	.44	.00	.527
q41_3 Limited: Personal obligations	9	0	.67	1.00	.500
q41_4 Limited: Military obligations	9	0	.00	.00	.000
q41_5 Limited: Lack of FSU "Gen-Ed" credit/recognition	9	0	.11	.00	.333
q41_6 Limited: Professional obligations	9	0	.22	.00	.441
q41_7 Limited: Not interested	9	0	.22	.00	.441
q42 Currently or upon graduation, I plan to or have	9	0	4.78	3.00	3.993
q42a Other specified	9	0			
q43_1 Tools: FSU's Career Placement Services	8	1	.50	.50	.535
q43_2 Tools: Ferris Job Fairs	8	1	.63	1.00	.518
q43_3 Tools: Internship	8	1	.25	.00	.463
q43_4 Tools: Word-of-mouth	8	1	.38	.00	.518
q43_5 Tools: Newspaper	8	1	.00	.00	.000
q43_6 Tools: On-line	8	1	.38	.00	.518
q43_7 Tools: Not actively seeking employment	8	1	.00	.00	.000
q43_8 Tools: Other	8	1	.25	.00	.463
q43a Other specified	9	0			
q44 How did you hear of Career Placement Services	9	0	2.11	2.00	.782
q44a Other specified	9	0			
q45 My starting salary (without benefits) after graduation	2	7	5.50	5.50	.707
q46_1 Flexible: rural areas	8	1	.38	.00	.518
q46_2 Flexible: metropolitan areas	8	1	.38	.00	.518
q46_3 Flexible: outside West Michigan	8	1	.38	.00	.518
q46_4 Flexible: outside Michigan	8	1	.38	.00	.518
q46_5 Flexible: outside the Midwest area	8	1	.25	.00	.463
q46_6 Flexible: Internationally	8	1	.13	.00	.354
q46_7 Flexible: anywhere	8	1	.25	.00	.463

Statistics

	N				
	Valid	Missing	Mean	Median	Std. Deviation
q47 Believe your technical education at FSU has adequately prepared you	9	0	1.33	1.00	.707
q48 In what area(s) was your technical education lacking	9	0			
q49 Best describes your new position	2	7	3.00	3.00	.000
q49a Other specified	9	0			
q50 Type of industry your employer/business serves	2	7	8.00	8.00	7.071
q50a Other specified	9	0			
q51a Computer networking/Communications	9	0	2.78	3.00	.972
q51b Computer programming/Control	9	0	2.00	2.00	1.000
q51c Database	9	0	1.89	2.00	.601
q51d Office/Technical computer application software	9	0	2.56	2.00	.882
q51e Business knowledge	9	0	2.44	2.00	.726
q51f Hands-on skills	9	0	3.44	4.00	.726
q51g Leadership	9	0	3.00	3.00	.707
q51h Problem-solving	9	0	3.78	4.00	.441
q51i Teamwork skills	9	0	3.44	4.00	.726
q51j Technical knowledge	9	0	3.67	4.00	.500
q51k Interpersonal communication	9	0	3.00	3.00	.866
q51l Public speaking communication	9	0	2.67	3.00	.707
q51m Written communication	9	0	2.78	3.00	.972
q51n Management skills	9	0	2.56	3.00	.882
q51o Marketing & Sales	9	0	1.44	1.00	.527
q51p Mathematics	9	0	3.78	4.00	.441
q51q Physics/Chemistry/Science	8	1	2.75	2.50	.886
q51r Quality Assurance/Control	9	0	2.89	3.00	.601
q52 Additional comments	9	0			
q53 Name	9	0			
q54 Home address	9	0			
q55 Home phone	9	0			
q56 E-mail address	9	0			

Frequency Table

q15 I entered Ferris

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Immediately after high school	5	55.6	55.6	55.6
	With an Associate's degree	3	33.3	33.3	88.9
	Transferred from another school/institution with more than 12 credits	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q15a Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	100.0	100.0	100.0

q16 Other degrees earned before coming to Ferris

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		5	55.6	55.6	55.6
	AAS Mechanical Design	1	11.1	11.1	66.7
	AAS Mechanical Drafting and Design	1	11.1	11.1	77.8
	Associates Degree Mechanical Engineering	1	11.1	11.1	88.9
	Associates Mechanical Drafting/CAD @ GRCC	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q17 Last high school/college attended prior to Ferris

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cardinal mooney	1	11.1	11.1	11.1
	Elkhart Central High School (IN)	1	11.1	11.1	22.2
	Grand Rapids Community College	2	22.2	22.2	44.4
	Homeschooled	1	11.1	11.1	55.6
	Hudsonville High School	1	11.1	11.1	66.7
	Montabella High School	1	11.1	11.1	77.8
	Rockford High School	1	11.1	11.1	88.9
	Union High School GR MI	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q18_1 Learn: HS teacher/Counselor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	7	77.8	77.8	77.8
	Selected Total	2	22.2	22.2	100.0
		9	100.0	100.0	

q18_2 Learn: Voc/Tech school teacher/Counselor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	9	100.0	100.0	100.0

q18_3 Learn: While attending another program at FSU

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	9	100.0	100.0	100.0

q18_4 Learn: From advisor at another college

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	8	88.9	88.9	88.9
	Selected Total	1	11.1	11.1	100.0
		9	100.0	100.0	

q18_5 Learn: From visit by FSU faculty at other college

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	9	100.0	100.0	100.0

q18_6 Learn: General marketing, bill boards, etc.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	7	77.8	77.8	77.8
	Selected Total	2	22.2	22.2	100.0
		9	100.0	100.0	

q18_7 Learn: Site tour of high school students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	9	100.0	100.0	100.0

q18_8 Learn: Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	4	44.4	44.4	44.4
	Selected Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q18a Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	44.4	44.4	44.4
	Brother	1	11.1	11.1	55.6
	Football Recruiting	1	11.1	11.1	66.7
	I learned about Ferris from other students that were currently attending.	1	11.1	11.1	77.8
	PDET Available Downtown at Nights	1	11.1	11.1	88.9
	While attending classes at the GRCC ATC	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q19 Which Ferris program did you transfer from

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	100.0	100.0	100.0

q20 Why did you switch programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	100.0	100.0	100.0

q21_1 Format: On-line

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	8	88.9	88.9	88.9
	Selected Total	1	11.1	11.1	100.0
		9	100.0	100.0	

q21_2 Format: Main campus (face-to-face)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	3	33.3	33.3	33.3
	Selected Total	6	66.7	66.7	100.0
		9	100.0	100.0	

q21_3 Format: Off-campus (face-to-face)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	6	66.7	66.7	66.7
	Selected Total	3	33.3	33.3	100.0
		9	100.0	100.0	

q21_4 Format: Non-Ferris face-to-face

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	9	100.0	100.0	100.0

q21_5 Format: Non-Ferris on-line

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Selected	9	100.0	100.0	100.0

q22 Format do you prefer

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Face-to-face	9	100.0	100.0	100.0

q23 Why you prefer that format

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Complete understanding of the material.	1	11.1	11.1	11.1
	Easier to learn	1	11.1	11.1	22.2
	Easier to learn.	1	11.1	11.1	33.3
	I learn better with examples and interaction, which is hard to have with an online class. I enjoy working with the professor to gain an understanding, rather than sending an email about a question and receiving a response days later.	1	11.1	11.1	44.4
	I like both formats. I chose face-to-face because there are certain courses (math, physics, etc.) where I think it would be too difficult to ask questions/get answers if it was over the internet.For courses like english or humanities I prefer the online format.	1	11.1	11.1	55.6
	Learn more hands on	1	11.1	11.1	66.7
	More personal	1	11.1	11.1	77.8
	Perfect setting for Q and A. Also feeding from other students questions in the classes	1	11.1	11.1	88.9
	With the smaller class sizes, it is great to have personal relationships with the professors.	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q24 When did you first start at Ferris

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	09/06	1	11.1	11.1	11.1
	09/07	1	11.1	11.1	22.2
	09/08	1	11.1	11.1	33.3
	09/09	1	11.1	11.1	44.4
	09/10	1	11.1	11.1	55.6
	09/2008	1	11.1	11.1	66.7
	8/08	1	11.1	11.1	77.8
	Fall 2006	1	11.1	11.1	88.9
	September, 2008	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q25a Appropriate mastery of the techniques, skills, and tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	5	55.6	55.6	55.6
	Strongly Agree Total	4	44.4	44.4	100.0
		9	100.0	100.0	

q25b Good critical thinking, problem solving & decision making skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	22.2	22.2	22.2
	Strongly Agree Total	7	77.8	77.8	100.0
		9	100.0	100.0	

q25c Strong technical understanding of my field

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	44.4	44.4
	Strongly Agree Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q25d Ability to apply technical theory to practical situations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral Somewhat	1	11.1	11.1	11.1
	Agree Strongly	3	33.3	33.3	44.4
	Agree Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q25e Self-motivation & enthusiasm for my chosen profession

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	11.1	11.1	11.1
	Somewhat Agree	3	33.3	33.3	44.4
	Strongly Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q25f Oral & writing skills necessary to communicate effectively

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	11.1	11.1	11.1
	Somewhat Agree	4	44.4	44.4	55.6
	Strongly Agree	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

q25g Prepared and able to assume responsibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	11.1	11.1	11.1
	Somewhat Agree	3	33.3	33.3	44.4
	Strongly Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q25h Provided adequate social awareness courses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	11.1	11.1	11.1
	Somewhat Agree	3	33.3	33.3	44.4
	Strongly Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q25i Effectively used available resources from my program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	2	22.2	22.2	22.2
	Somewhat Agree	1	11.1	11.1	33.3
	Strongly Agree	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

q25j Worked well with individuals with diverse backgrounds

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral Somewhat	1	11.1	11.1	11.1
	Agree Strongly	3	33.3	33.3	44.4
	Agree Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q25k Commitment to quality, timeliness, continuous improvement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	44.4	44.4
	Strongly Agree Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q25l Good ethical values

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral Somewhat	1	11.1	11.1	11.1
	Agree Strongly	2	22.2	22.2	33.3
	Agree Total	6	66.7	66.7	100.0
		9	100.0	100.0	

q25m Challenged intellectually by my courses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral Somewhat	1	11.1	11.1	11.1
	Agree Strongly	3	33.3	33.3	44.4
	Agree Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q25n Motivated to a higher level of performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	44.4	44.4
	Strongly Agree Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q25o Design and conduct experiments, as well as to analyze and interpret data

		Frequency	Percent
Missing	System	9	100.0

q25p Design a system, component, or process to meet desired needs within realistic constraints

		Frequency	Percent
Missing	System	9	100.0

q25q Broad education necessary to understand the impact of technical/engineering solutions

		Frequency	Percent
Missing	System	9	100.0

q25r Function effectively on (multidisciplinary) teams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	11.1	11.1	11.1
	Somewhat Agree	2	22.2	22.2	33.3
	Strongly Agree	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

q25s Identify, formulate, analyze and solve technical or engineering problems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	44.4	44.4
	Strongly Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q25t Recognized the need for life-long learning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	11.1	12.5	12.5
	Somewhat Agree	4	44.4	50.0	62.5
	Strongly Agree	3	33.3	37.5	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q25u Understand professional, ethical and social responsibilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	6	66.7	66.7	66.7
	Strongly Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q25v Apply current knowledge and adapt to emerging applications

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral Somewhat	2	22.2	22.2	22.2
	Agree Strongly	5	55.6	55.6	77.8
	Agree Total	2	22.2	22.2	100.0
		9	100.0	100.0	

q25w Conduct, analyze and interpret experiments, and apply experimental results

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	11.1	11.1	11.1
	Neutral	1	11.1	11.1	22.2
	Somewhat Agree	3	33.3	33.3	55.6
	Strongly Agree Total	4	44.4	44.4	100.0
		9	100.0	100.0	

q25x Apply creativity in the design of systems, components, or processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	3	33.3	37.5	37.5
	Strongly Agree	5	55.6	62.5	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q25y Respect for diversity and knowledge of contemporary professional, societal and global issues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral Somewhat	2	22.2	22.2	22.2
	Agree Strongly	4	44.4	44.4	66.7
	Agree Total	3	33.3	33.3	100.0
		9	100.0	100.0	

q25z Provided a good mix of courses for my career options

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral Somewhat	3	33.3	33.3	33.3
	Agree Strongly	2	22.2	22.2	55.6
	Agree Total	4	44.4	44.4	100.0
		9	100.0	100.0	

q25aa Provided adequate technical content courses by my program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral Somewhat Agree Strongly	2	22.2	22.2	22.2
	Agree Total	2	22.2	22.2	44.4
		5	55.6	55.6	100.0
		9	100.0	100.0	

q26a Overall mastery of subject matter

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	44.4	44.4
	Strongly Agree Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q26b Adequate instruction in the classroom

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	44.4	44.4
	Strongly Agree Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q26c Involved in my education process inside the classroom

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	44.4	44.4
	Strongly Agree Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q26d Involved in my education process outside the classroom

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	11.1	11.1	11.1
	Somewhat Agree	3	33.3	33.3	44.4
	Strongly Agree Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q26e Accessible for advising

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	3	33.3	33.3	33.3
	Strongly Agree Total	6	66.7	66.7	100.0
		9	100.0	100.0	

q26f Helpful in advising

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	3	33.3	33.3	33.3
	Strongly Agree	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

q27a Curriculum is current for my industry/profession

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	22.2	22.2	22.2
	Strongly Agree	7	77.8	77.8	100.0
	Total	9	100.0	100.0	

q27b Overall quality of the labs & hands-on components were relevant

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	44.4	44.4
	Strongly Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q27c Rate the quality of my curriculum as good

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	3	33.3	33.3	33.3
	Strongly Agree	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

q28 Required an internship experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	22.2	22.2	22.2
	No	7	77.8	77.8	100.0
	Total	9	100.0	100.0	

q29 The internship experience was an important aspect

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	22.2	100.0	100.0
Missing	System	7	77.8		
Total		9	100.0		

q30a Classrooms provide a good learning environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	11.1	11.1	11.1
	Somewhat Agree	4	44.4	44.4	55.6
	Strongly Agree	Total 4	44.4	44.4	100.0
		9	100.0	100.0	

q30b Equipment & supplies were available and maintained

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	11.1	11.1	11.1
	Somewhat Agree	5	55.6	55.6	66.7
	Strongly Agree	Total 3	33.3	33.3	100.0
		9	100.0	100.0	

q30c Lab equipment was representative

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	6	66.7	66.7	66.7
	Strongly Agree	Total 3	33.3	33.3	100.0
		9	100.0	100.0	

q30d Instructional lab facilities were in good condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	5	55.6	55.6	55.6
	Strongly Agree	Total 4	44.4	44.4	100.0
		9	100.0	100.0	

q31a Experiences other than coursework were valuable part of my education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	22.2	22.2	22.2
	Somewhat Disagree	1	11.1	11.1	33.3
	Strongly Agree	Total 6	66.7	66.7	100.0
		9	100.0	100.0	

q31b Guest speakers were a valuable part of my education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	11.1	11.1	11.1
	Somewhat Disagree	2	22.2	22.2	33.3
	Somewhat Agree	3	33.3	33.3	66.7
	Strongly Agree	Total 3	33.3	33.3	100.0
		9	100.0	100.0	

q31c Adequate learning resources were available

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	6	66.7	66.7	66.7
	Strongly Agree Total	3	33.3	33.3	100.0
		9	100.0	100.0	

q31d My overall campus experience was satisfying

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	3	33.3	33.3	33.3
	Strongly Agree Total	6	66.7	66.7	100.0
		9	100.0	100.0	

q31e I would recommend my program to others

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	11.1	11.1	11.1
	Somewhat Agree	1	11.1	11.1	22.2
	Strongly Agree Total	7	77.8	77.8	100.0
		9	100.0	100.0	

q31f I would be interested in working to advance my program at FSU

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	11.1	11.1	11.1
	Somewhat Disagree	3	33.3	33.3	44.4
	Somewhat Agree	3	33.3	33.3	77.8
	Strongly Agree Total	2	22.2	22.2	100.0
		9	100.0	100.0	

q31g Overall, I am very satisfied with my education at FSU

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	22.2	22.2	22.2
	Strongly Agree Total	7	77.8	77.8	100.0
		9	100.0	100.0	

q32 Overall campus experience was satisfying (why/why not)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	88.9	88.9	88.9
	The facility at Grand Rapids was very nice and well equipped for my FSU classes.	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q33 Recommend your program to others (why/why not)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	88.9	88.9	88.9
	The program provides an outstanding foundation for design engineering and the professors take the time to work with non-traditional students and understand their needs. Other universities discourage non-traditional students, which I never found to be the case with Ferris. The PDET program also focuses on real-world problem solving and less theory, which means I can apply what I am learning to what I do at work. The program is outstanding in every way!	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q34 I was a student member of at least one industry/professional organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	22.2	22.2	22.2
	No	6	66.7	66.7	88.9
	Not aware of industry/professional organizations	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q35 Do you believe your membership helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes		1	11.1	50.0	50.0
	No	1	11.1	50.0	100.0
	Total	2	22.2	100.0	
Missing	System	7	77.8		
Total		9	100.0		

q36 I participated in other campus/community organizations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	11.1	11.1	11.1
	No	7	77.8	77.8	88.9
	Not aware of other opportunities	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q37 I served in a leadership position for a student or industry/professional organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	2	22.2	100.0	100.0
Missing	System	7	77.8		
Total		9	100.0		

q38 Do you believe your leadership position helpful

	Frequency	Percent
Missing System	9	100.0

q39 Were you made aware of and apply for scholarship opportunities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes No	7	77.8	77.8	77.8
	Not aware of scholarship opportunities	1	11.1	11.1	88.9
	Total	1	11.1	11.1	100.0
		9	100.0	100.0	

q40a Study Abroad

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes No	3	33.3	33.3	33.3
	Total	6	66.7	66.7	100.0
		9	100.0	100.0	

q40b Internship Abroad

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes No	2	22.2	22.2	22.2
	Total	7	77.8	77.8	100.0
		9	100.0	100.0	

q40c I did participate in the Internship Abroad program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	9	100.0	100.0	100.0

q41_1 Limited: Funding

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	4	44.4	44.4	44.4
	Selected Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q41_2 Limited: Time

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	5	55.6	55.6	55.6
	Selected Total	4	44.4	44.4	100.0
		9	100.0	100.0	

q41_3 Limited: Personal obligations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	3	33.3	33.3	33.3
	Selected Total	6	66.7	66.7	100.0
		9	100.0	100.0	

q41_4 Limited: Military obligations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	9	100.0	100.0	100.0

q41_5 Limited: Lack of FSU "Gen-Ed" credit/recognition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	8	88.9	88.9	88.9
	Selected Total	1	11.1	11.1	100.0
		9	100.0	100.0	

q41_6 Limited: Professional obligations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	7	77.8	77.8	77.8
	Selected Total	2	22.2	22.2	100.0
		9	100.0	100.0	

q41_7 Limited: Not interested

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	7	77.8	77.8	77.8
	Selected Total	2	22.2	22.2	100.0
		9	100.0	100.0	

q42 Currently or upon graduation, I plan to or have

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Seek employment	2	22.2	22.2	22.2
	Not received a job offer yet	2	22.2	22.2	44.4
	Received 1 job offer	1	11.1	11.1	55.6
	Accepted a position within my major	2	22.2	22.2	77.8
	Other	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

q42a Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	88.9	88.9	88.9
	Already Employeed as a Product Design Engineer	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q43_1 Tools: FSU's Career Placement Services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	4	44.4	50.0	50.0
	Selected	4	44.4	50.0	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q43_2 Tools: Ferris Job Fairs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	3	33.3	37.5	37.5
	Selected	5	55.6	62.5	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q43_3 Tools: Internship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	6	66.7	75.0	75.0
	Selected	2	22.2	25.0	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q43_4 Tools: Word-of-mouth

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	5	55.6	62.5	62.5
	Selected	3	33.3	37.5	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q43_5 Tools: Newspaper

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	8	88.9	100.0	100.0
Missing	System	1	11.1		
Total		9	100.0		

q43_6 Tools: On-line

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	5	55.6	62.5	62.5
	Selected	3	33.3	37.5	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q43_7 Tools: Not actively seeking employment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	8	88.9	100.0	100.0
Missing	System	1	11.1		
Total		9	100.0		

q43_8 Tools: Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	6	66.7	75.0	75.0
	Selected	2	22.2	25.0	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q43a Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		7	77.8	77.8	77.8
	Already Employeed as a Product Design Engineer	1	11.1	11.1	88.9
	found employment without the use of FSU career services.	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q44 How did you hear of Career Placement Services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ferris Job Fairs	2	22.2	22.2	22.2
	Word of mouth	4	44.4	44.4	66.7
	Other	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q44a Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		6	66.7	66.7	66.7
	Already Employeed as a Product Design Engineer	1	11.1	11.1	77.8
	guest speakers	1	11.1	11.1	88.9
	Speaker in class	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q45 My starting salary (without benefits) after graduation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	$45,000-$49,999	1	11.1	50.0	50.0
	$50,000-$54,999	1	11.1	50.0	100.0
	Total	2	22.2	100.0	
Missing	System	7	77.8		
Total		9	100.0		

q46_1 Flexible: rural areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	5	55.6	62.5	62.5
	Selected	3	33.3	37.5	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q46_2 Flexible: metropolitan areas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	5	55.6	62.5	62.5
	Selected	3	33.3	37.5	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q46_3 Flexible: outside West Michigan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	5	55.6	62.5	62.5
	Selected	3	33.3	37.5	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q46_4 Flexible: outside Michigan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	5	55.6	62.5	62.5
	Selected	3	33.3	37.5	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q46_5 Flexible: outside the Midwest area

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	6	66.7	75.0	75.0
	Selected	2	22.2	25.0	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q46_6 Flexible: Internationally

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	7	77.8	87.5	87.5
	Selected	1	11.1	12.5	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q46_7 Flexible: anywhere

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	6	66.7	75.0	75.0
	Selected	2	22.2	25.0	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q47 Believe your technical education at FSU has adequately prepared you

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	77.8	77.8	77.8
	No	1	11.1	11.1	88.9
	Don't know	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q48 In what area(s) was your technical education lacking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		6	66.7	66.7	66.7
	Electrical	1	11.1	11.1	77.8
	realistic experiance	1	11.1	11.1	88.9
	The statistics class lacked the ability to use Excel to enter data and run calculations, which is something I need to do at work on a regular basis. I would have wished for less humanity classes and more technical classes, such as a stand alone statistics and FEA class.	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q49 Best describes your new position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Engineering	2	22.2	100.0	100.0
Missing	System	7	77.8		
Total		9	100.0		

q49a Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	100.0	100.0	100.0

q50 Type of industry your employer/business serves

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Automotive	1	11.1	50.0	50.0
	HVACR	1	11.1	50.0	100.0
	Total	2	22.2	100.0	
Missing	System	7	77.8		
Total		9	100.0		

q50a Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	100.0	100.0	100.0

q51a Computer networking/Communications

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	1	11.1	11.1	11.1
	Somewhat Important	2	22.2	22.2	33.3
	Very Important Critical	4	44.4	44.4	77.8
	Total	2	22.2	22.2	100.0
		9	100.0	100.0	

q51b Computer programming/Control

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	3	33.3	33.3	33.3
	Somewhat Important	4	44.4	44.4	77.8
	Very Important Critical	1	11.1	11.1	88.9
	Total	1	11.1	11.1	100.0
		9	100.0	100.0	

q51c Database

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	2	22.2	22.2	22.2
	Somewhat Important	6	66.7	66.7	88.9
	Very Important	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q51d Office/Technical computer application software

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	6	66.7	66.7	66.7
	Very Important Critical	1	11.1	11.1	77.8
	Total	2	22.2	22.2	100.0
		9	100.0	100.0	

q51e Business knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	6	66.7	66.7	66.7
	Very Important Critical	2	22.2	22.2	88.9
	Total	1	11.1	11.1	100.0
		9	100.0	100.0	

q51f Hands-on skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	1	11.1	11.1	11.1
	Very Important Critical	3	33.3	33.3	44.4
	Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q51g Leadership

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	2	22.2	22.2	22.2
	Very Important Critical	5	55.6	55.6	77.8
	Total	2	22.2	22.2	100.0
		9	100.0	100.0	

q51h Problem-solving

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	2	22.2	22.2	22.2
	Critical	7	77.8	77.8	100.0
	Total	9	100.0	100.0	

q51i Teamwork skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	1	11.1	11.1	11.1
	Very Important Critical	3	33.3	33.3	44.4
	Total	5	55.6	55.6	100.0
		9	100.0	100.0	

q51j Technical knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	3	33.3	33.3	33.3
	Critical	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

q51k Interpersonal communication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	3	33.3	33.3	33.3
	Very Important Critical	3	33.3	33.3	66.7
	Total	3	33.3	33.3	100.0
		9	100.0	100.0	

q51l Public speaking communication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	4	44.4	44.4	44.4
	Very Important Critical	4	44.4	44.4	88.9
	Total	1	11.1	11.1	100.0
		9	100.0	100.0	

q51m Written communication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	1	11.1	11.1	11.1
	Somewhat Important	2	22.2	22.2	33.3
	Very Important Critical	4	44.4	44.4	77.8
	Total	2	22.2	22.2	100.0
		9	100.0	100.0	

q51n Management skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	1	11.1	11.1	11.1
	Somewhat Important	3	33.3	33.3	44.4
	Very Important Critical	4	44.4	44.4	88.9
	Total	1	11.1	11.1	100.0
		9	100.0	100.0	

q51o Marketing & Sales

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	5	55.6	55.6	55.6
	Somewhat Important	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

q51p Mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	2	22.2	22.2	22.2
	Critical	7	77.8	77.8	100.0
	Total	9	100.0	100.0	

q51q Physics/Chemistry/Science

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	4	44.4	50.0	50.0
	Very Important	2	22.2	25.0	75.0
	Critical	2	22.2	25.0	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q51r Quality Assurance/Control

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	2	22.2	22.2	22.2
	Very Important	6	66.7	66.7	88.9
	Critical	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q52 Additional comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	100.0	100.0	100.0

q53 Name

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	11.1	11.1	11.1
	Adam Udell	1	11.1	11.1	22.2
	Bryan Redeker	1	11.1	11.1	33.3
	Chris Holwerda	1	11.1	11.1	44.4
	Clark Wright	1	11.1	11.1	55.6
	Derek Brenner	1	11.1	11.1	66.7
	Joe Miner	1	11.1	11.1	77.8
	Nicholas kain	1	11.1	11.1	88.9
	Patrick Sedlecky	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q54 Home address

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	11.1	11.1	11.1
	15415 Sundew	1	11.1	11.1	22.2
	22532 Winchester Drive, Elkhart, IN 46514	1	11.1	11.1	33.3
	3601 E Lake Montcalm Road Edmore MI 48829	1	11.1	11.1	44.4
	3730 13 mile rd ne Sparta MI	1	11.1	11.1	55.6
	4191 Allie Ct., Hudsonville, MI 49426	1	11.1	11.1	66.7
	4918 15 mile Road, Cedar Springs, MI 49319	1	11.1	11.1	77.8
	52760 Washington st new Baltimore mi 48047	1	11.1	11.1	88.9
	6935 Rollingview Dr. Hudsonville MI, 49426	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q55 Home phone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	11.1	11.1	11.1
	574-596-1601	1	11.1	11.1	22.2
	5867255243	1	11.1	11.1	33.3
	616-366-6918	1	11.1	11.1	44.4
	616-405-5534	1	11.1	11.1	55.6
	616-662-1223	1	11.1	11.1	66.7
	616-813-4939	1	11.1	11.1	77.8
	616-914-2548	1	11.1	11.1	88.9
	9894273510	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q56 E-mail address

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	11.1	11.1	11.1
	adamudell12@gmail.com	1	11.1	11.1	22.2
	brenned1@ferris.edu	1	11.1	11.1	33.3
	BRGT350@gmail.com	1	11.1	11.1	44.4
	cjholwerda@sbcglobal.net	1	11.1	11.1	55.6
	joe.miner@irwinseating.com	1	11.1	11.1	66.7
	Kainn1@ferris.edu	1	11.1	11.1	77.8
	pjsedlecky@yahoo.com	1	11.1	11.1	88.9
	wrighc15@ferris.edu	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Student Survey Responses

Survey Question: (Surveys 2010 – 2013, All Responses)

"If you could change one thing about the PDET program, what would it be?"

2010 Comments:

- Nothing
- Internship
- Switch the FEA and GD&T
- More designing
- Have internship, CNC
- Move GD&T to fall 4th year
- I would change the order and have 422 and 413 switched so we know FEA before working on 499
- COMM 336
- Ergonomics GD&T
- Have a more structured PDET 499 class to limit procrastination
- Remove GEOG 100 – not related to PDET
- PRO-E, for gosh sake did you even have to ask?
- Need a course for quality class
- Get rid of PRO-E
- PRO-E is good, but should not be exclusive drafting program for the class
- More effective COMM class

2011 Comments:

- More preparation for the extent of the work for the 499, up until that class I seldom had to work hard to success
- I would want to use different solid modeling software
- I would want more hands-on labs
- The CAD software used. I really did not enjoy PRO-E
- Add more art programs to increase hand sketching, etc.
- None
- More lab work other than CAD software
- n/a, every class taught me something new and valuable. I just really don't enjoy English even when I know it will help out later.
- PRO-E
- No ART 101

2012 Comments:

- Nothing
- COMM 336
- More modeling and real world situations
- More hand drawings, aesthetics design
- Take more time with PRO-E interface
- Additional small projects
- Nothing, great program
- I feel that the PRO-E classes need more drafting assignments
- Education on multiple software 3D modeling programs
- More PRO-E training on software side
- "?? Plastic" lab time and more lab time overall; trip to a production plant to see how engineers work
- Make MET and PDET combined courses to there isn't overlap of classes
- ARTS shouldn't be a requirement
- Different styles of modeling in PRO-E
- ?? - I'm too tired from my 350+ hours on my project

2013 Comments:

- More time for the project
- Remove COMM 336
- ?? full year
- Less writing on the final report; it is a technical report
- Nothing
- Make it a four-year program
- Learn Solidworks or CATIA as well to be more diverse
- Own computer lab
- Add senior project classes to fall 4th year
- PDET 499 should be broke up into two semesters - not all of it – just some

Survey Question: (All Surveys 2007 – 2013, All Responses)

"Please feel free to add any comments or recommendations about any aspect of the PDET program in the space provided:"

2007 Comments:

- 1GB mandatory for required RAM
- Free Mr. Koepf from such a large load of classes. He seemed too scattered to focus on one class. I feel our PDET 411 class was given less emphasis and guidance than what we needed.
- Program was awesome, learned a lot. Professors were great and very helpful.
- I didn't want to buy a laptop, but it was nice to have the software and be able to take it with me instead of coming to the lab.
- Should maybe require an internship
- Thanks for everything
- I really enjoyed this program – thanks!
- Incredible experience. Thanks for everything!

2008 Comments:

No comments on surveys

2009 Comments:

- I learned a lot in PDET. It makes you work harder than the associates; however, it feels more rewarding. Overall a great program.
- I enjoyed everything I learned. I feel that I experienced a number of aspects of design that will help in the future.
- I enjoyed my time here, learned a lot, great program
- Feel project should have drafts turned in periodically, i.e., one chapter at a time
- Give more information about senior project before this semester so we could work on it earlier.
- I feel that the program should use different software other than PRO-E. Also I feel that the projects preliminary and final proposals should be du sooner in the semester.
- I believe that different CAD software would be better. Approve projects end of the fall semester so the full spring semester can be used to work on the project.

2010 Comments:

- It's been real, boys!
- Good class content required for program

2011 Comments:

- Overall, a challenging major. My biggest concern has to do with the 499 project. I feel little prior to the project prepared me for the extent of the work needed to complete it. I spent nearly every minute working to complete the report and I still wish I had more time.
- I am satisfied with my experience while in the PDET program. The professors, Mr. Goosen and Mr. Koepf, were really helpful whenever I needed help. I would highly recommend this program to anyone who is thinking about going into it.
- I enjoyed the PDET program very much and the one class that I thought was the best and most useful was the senior project because it teaches the student what critical things must be done throughout the design process and gives them something to show future employers as an indication of their work ethic.
- I thoroughly enjoyed this program. The content is excellent and I feel prepared to handle any job thrown my way. Thank you very much for all of your hard work and dedication to the learning of your students. Your passion shines through.
- PRO-E works well for teaching and I hear that it is used in industry; however, I have yet to talk to or find a company that uses it.

2012 Comments:

- Thank you for the past two years. Really learned a lot from everyone and appreciate the way things were taught. Thank you very much.

2013 Comments:

- CREO is not the easiest program to get along with
- A two-year degree would be good for people that are looking to be a CAD jockey
- Best opportunity ever!!
- I feel like the PDET program should be a four-year degree because I would like to see more manufacturing done that deals with our designed parts.

Additional Survey Question as of 2010:

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.

1

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

Assessment and Evaluation - TRACDAT Reports

PDET Curriculum Map

PDET Assessment by Objectives

PDET Course Outcomes Summary

PDET Assessment Summary – June 2012
(Presented to PDET Advisory Board 11/30/13)

PDET Program Checksheet – Fall 2013

Program - Product Design Engineering Technology (B.S.) - Curriculum Map

Legend: (A) - Program Assessment, (I) - Introduced, (M) - Mastery, (R) - Reinforced

Outcomes	ARTS 101	CHEM 103	COMM 336	EEET 201	ENGL 321	GEOG 100	MATH 216	MATL 341	MECH 340	MFGE 352	PDET 311	PDET 312	PDET 321	PDET 322	PDET 411	PDET 412	PDET 413	PDET 415	PDET 422	PDET 499	PLTS 342
Mechanical Design - Student will demonstrate the ability to apply engineering principles in the development of mechanical Designs from initial concept through realization suitable for manufacturing								M, R	R	I	I	M	M	I	M	M	I	M	M	A	M
Computer Aided Design - Students will demonstrate the ability to document mechanical designs using Computer Aided Design (CAD).														I				M		A	
Oral presentation - Students will demonstrate the ability to present design concepts and realizations via formal			M																	A	

Outcomes	ARTS 101	CHEM 103	COMM 336	EEET 201	ENGL 321	GEOG 100	MATH 216	MATL 341	MECH 340	MFGE 352	PDET 311	PDET 312	PDET 321	PDET 322	PDET 411	PDET 412	PDET 413	PDET 415	PDET 422	PDET 499	PLTS 342
oral presentations			M																	A	
Written communications - Students will demonstrate the ability to present design concepts and realizations in written form	I				M															A, M	
Fundamental technical knowledge - Students will demonstrate a fundamental knowledge of mathematics, physical sciences and engineering science applicable to the design of mechanical products.		I		R			R		R				R				R			A	
Graduate Employment - PDET program graduates will be employable at a competitive salary / wage																					

Assessment Impact by Unit Objectives

Ferris State University

Program - Product Design Engineering Technology (B.S.)

Program - Product Design Engineering Technology (B.S.)

Mission Statement: The mission of the Product Design Engineering Technology program is to provide 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.

Advisory Board/Committee Meetings: Once every two years

Next FSU Academic Program Review: 2013-2014

Accreditor Body: None

College: CET

Outcome: Mechanical Design

Student will demonstrate the ability to apply engineering principles in the development of mechanical Designs from initial concept through realization suitable for manufacturing.

Outcome Type: Learning

Start Date: 01/12/2009

End Date: 05/11/2009

Outcome Status: Active

Means of Assessment

Assessment Method	Criterion for Success	Assessment Schedule	Active
Capstone evaluation of the mechanical design content of an individual product development as described in a formal written report. **Assessment Method Category:** Written Product (essay, research paper, journal, newsletter, etc.)	Students will achieve a score a score of 70% or better on relevant sections of the capstone report.	Spring term each year.	Yes

Related Courses

- MATL 341 - Material Selection Metals
- MECH 340 - Statics-Strength of Materials
- MFGE 352 - Design For Manufacturing

  Related Documents:
  MFGE 352 Syllabus SU10 Joyce
- PDET 311 - Seminar in Product Design
- PDET 312 - Advanced Tolerancing
- PDET 321 - Applied Mechanics-Kinematics
- PDET 322 - Model - Prototype Development
- PDET 411 - Machine Design
- PDET 412 - Statistics - Ergonomics
- PDET 413 - Applied Fluids - Thermodynam
- PDET 415 - Advanced Solid Modeling CAD
- PDET 422 - Advanced Machine Design
- PDET 499 - Product Design Project
- PLTS 342 - Plastic Material Select-PDET

Results

Result	Action	Follow-Up	Action
Written Product (essay, research paper, journal, newsletter, etc.) - 05/22/2013 - 3 of 18 students scored below 70%. 1 student scored below 60%. Class average= 80.1%.			1 - No Action Required

Results			
Result	**Action**	**Follow-Up**	**Action**
See PDET 499 Course outcomes for Spring 2013. **Classification:** Criterion Not Met **Related Documents:** PDET499Sp13 Outcome 1.xls			
Written Product (essay, research paper, journal, newsletter, etc.) - 05/16/2012 - 7 of 31 students scored less than 70%. 1 of 31 students scored less than 60%. Class average was 92.0%. See PDET 499 course outcomes for Spring 2012 **Classification:** Criterion Not Met **Related Documents:** PDET499Sp12 Outcome 1.xls			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 08/22/2011 - 3 of 12 students scored less than 70%. Class average was 83.8%. See PDET 499 capstone course outcomes for Spring 2011. **Classification:** Inconclusive			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 07/29/2010 - One of 21 students failed to score 70% for this outcome in Spring 2010. See PDET 499 capstone course outcomes for Spring 2010. **Classification:** Criterion Met			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 10/22/2009 - 10 of 12 (83%) students evaluated in Spring 2009 met the minimum requirements of this outcome. **Classification:** Criterion Met			1 - No Action Required

Outcome: Computer Aided Design

Students will demonstrate the ability to document mechanical designs using Computer Aided Design (CAD).

Outcome Type: Learning
Start Date: 01/12/2009
End Date: 05/08/2009
Outcome Status: Active

Means of Assessment			
Assessment Method	**Criterion for Success**	**Assessment Schedule**	**Active**
Capstone evaluation of the CAD drawing documentation of an individual product development as presented in a formal written report. **Assessment Method Category:** Written Product (essay, research paper, journal, newsletter, etc.)	Students will achieve a score a score of 70% or better on drawings of a mechanical product prepared using Computer Aided Design.	Spring Term	Yes

Related Courses

- PDET 322 - Model - Prototype Development

- PDET 415 - Advanced Solid Modeling CAD
- PDET 499 - Product Design Project

Results			
Result	**Action**	**Follow-Up**	**Action**
Written Product (essay, research paper, journal, newsletter, etc.) - 05/22/2013 - 4 of 18 students scored below 70%. 2 students scored below 60%. Class average = 75.2%. See PDET 499 course outcomes for Spring 2013. **Classification:** Criterion Not Met **Related Documents:** PDET499Sp13 outcome 2.xls			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 05/16/2012 - 13 of 31 students scored less than 70%. 1 of 31 students scored less than 60%. Class average was 74.8% See PDET 499 for Spring 2012. **Classification:** Criterion Not Met **Related Documents:** PDET499Sp12 outcome 2.xls			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 08/22/2011 - 4 of 12 students scored below 70%. Class average was 73.9%. See PDET 499 capstone course results for Spring 2011. **Classification:** Inconclusive			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 07/29/2010 - Seven of 21 students failed to score 70% for this outcome in Spring 2010. See PDET 499 capstone course outcomes for Spring 2010. **Classification:** Inconclusive			1 - No Action Required

Outcome: Oral presentation

Students will demonstrate the ability to present design concepts and realizations via formal oral presentations

Outcome Type: Learning
Start Date: 01/12/2009
End Date: 05/11/2009
Outcome Status: Active

Means of Assessment			
Assessment Method	**Criterion for Success**	**Assessment Schedule**	**Active**
Capstone evaluation of a formal presentation made to a review board comprised of faculty and engineering professionals. **Assessment Method Category:** Presentation(Oral)	Students will achieve a score a score of 70% or better on a presentation including the definition of a problem, a description of their design solution, the methods used to develop the design, the analysis supporting the design, a detailed cost analysis of the design and possible improvements to their design using oral presentation	Spring Term	Yes

Means of Assessment			
Assessment Method	**Criterion for Success**	**Assessment Schedule**	**Active**
	supported by appropriate visual media.		

Related Courses

- COMM 336 - Tech and Prof Presentation
- PDET 499 - Product Design Project

Results			
Result	**Action**	**Follow-Up**	**Action**
Presentation(Oral) - 05/22/2013 - 3 of 18 students scored below 70%. No student scored below 60%. Class average = 84.8%. See PDET 499 course outcomes for Spring 2013. **Classification:** Criterion Not Met **Related Documents:** PDET499Sp13 outcome 3.xls			1 - No Action Required
Presentation(Oral) - 05/16/2012 - All students scored at/above 70%. Class average was 90.3% See PDET 499 for Spring 2012 **Classification:** Criterion Met **Related Documents:** PDET499Sp12 outcome 3.xls			1 - No Action Required
Presentation(Oral) - 08/22/2011 - All students scored at/above 70%. Class average was 84.2%. See PDET 499 capstone course outcomes for Spring 2011. **Classification:** Criterion Met			1 - No Action Required
Presentation(Oral) - 07/29/2010 - All 21 students score 70% or better for this outcome in Spring 2010. See PDET 499 capstone course outcomes for Spring 2010. **Classification:** Criterion Met			1 - No Action Required

Outcome: Written communications

Students will demonstrate the ability to present design concepts and realizations in written form

Outcome Type: Learning
Start Date: 01/12/2009
End Date: 05/11/2009
Outcome Status: Active

Means of Assessment			
Assessment Method	**Criterion for Success**	**Assessment Schedule**	**Active**
Capstone evaluation of a formal written report documenting the development of a product. **Assessment Method Category:** Written Product (essay, research paper, journal, newsletter, etc.)	Students will achieve a score a score of 70% or better on the evaluation of the writing elements of the capstone written report.	Each Spring Semester	Yes

Related Courses

- ARTS 101 - Basic Art
- ENGL 321 - Advanced Composition

  Related Documents:
  ENGL 321 F11 syllabus Hood.doc
- PDET 499 - Product Design Project

Results

Result	Action	Follow-Up	Action
Written Product (essay, research paper, journal, newsletter, etc.) - 05/22/2013 - All 18 students scored at 70% or better. Class average = 86.1%. See PDET 499 course outcomes for Spring 2013. **Classification:** Criterion Met **Related Documents:** PDET499Sp13 Outcome 4.xls			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 05/16/2012 - 8 students scored less than 70%. 1 of 31 students scored less than 60%. Class average was 78.2%. See PDET 499 for Spring 2012 **Classification:** Criterion Not Met **Related Documents:** PDET499Sp12 Outcome 4.xls			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 08/22/2011 - 1 student scored less than 70%. Class average was 81.5%. See PDET 499 capstone course results for Spring 2011. **Classification:** Inconclusive			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 07/29/2010 - Three of 21 students failed to score 70% for this outcome in Spring 2010. See PDET 499 capstone course outcomes for Spring 2010. **Classification:** Inconclusive			1 - No Action Required

Outcome: Fundamental technical knowledge

Students will demonstrate a fundamental knowledge of mathematics, physical sciences and engineering science applicable to the design of mechanical products.

Outcome Type: Learning
Start Date: 01/12/2009
End Date: 05/11/2009
Outcome Status: Active

Means of Assessment

Assessment Method	Criterion for Success	Assessment Schedule	Active
Evaluation of relevant sections of capstone project report. **Assessment Method Category:** Written Product (essay, research paper, journal, newsletter, etc.)	Students will achieve a score a score of 70% or better on relevant sections.	Spring Term	Yes

Related Courses

- CHEM 103 - Preparatory Chemistry
- EEET 201 - Electrical Fundamentals
- MATH 216 - Applied Calculus
- MECH 340 - Statics-Strength of Materials
- PDET 321 - Applied Mechanics-Kinematics
- PDET 413 - Applied Fluids - Thermodynam
- PDET 499 - Product Design Project

Results

Result	Action	Follow-Up	Action
Written Product (essay, research paper, journal, newsletter, etc.) - 05/22/2013 - 5 of 18 students scored below 70%. 2 students scored below 60%. Class average = 77.2%. See PDET 499 course outcomes for Spring 2013. **Classification:** Criterion Not Met **Related Documents:** PDET499Sp13 Outcome 5.xls			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 05/16/2012 - 10 of 31 students scored less than 70%. 2 of 31 students scored less than 60%. Class average was 86.2% See PDET 499 outcomes for Spring 2012. NOTE Methodology changed for Spring 2012 for this outcome. **Classification:** Criterion Not Met **Related Documents:** PDET499Sp12 Outcome 5.xls			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 08/22/2011 - 3 of 12 students scored less than 70%. Class average was 83.8%. See PDET 499 capstone course results for Spring 2011. **Classification:** Inconclusive			1 - No Action Required
Written Product (essay, research paper, journal, newsletter, etc.) - 07/29/2010 - One of 21 students failed to score 70% for this outcome in Spring 2010. See PDET 499 capstone course outcomes for Spring 2010. **Classification:** Criterion Met			1 - No Action Required

Outcome: Graduate Employment

PDET program graduates will be employable at a competitive salary / wage

Outcome Type: Other
Start Date: 02/08/2013
Outcome Status: Active

Means of Assessment

Assessment Method	Criterion for Success	Assessment Schedule	Active

Means of Assessment

Assessment Method	Criterion for Success	Assessment Schedule	Active
Assessment will be based on data provided by Career Services / Institutional Research **Assessment Method Category:** Data Analysis	80 % of PDET program graduates will be employed within one year of graduation at a wage / salary at or above the mean compensation of the College of Engineering Technology	Yearly	Yes

Results

Result	Action	Follow-Up	Action
Data Analysis - 05/22/2013 - Salary for 2012 graduates was %51,500 with 27% reporting (6 of 22 graduates). See attached survey. **Classification:** Inconclusive **Related Documents:** 2011-2012 salary survey.jpg			1 - No Action Required
Data Analysis - 06/01/2011 - see attached report. Salary for 2011 graduates was $44,143. 57% reporting (8 of 14 graduates). **Classification:** Criterion Met **Related Documents:** CET salary 2010 2011.pdf			1 - No Action Required
Data Analysis - 06/01/2010 - see attached report. Salary for 2010 graduates was $44,200. 28% reporting (7 of 25 graduates). **Classification:** Criterion Met **Related Documents:** CET salary 2009 2010.pdf			1 - No Action Required
Data Analysis - 06/01/2009 - see attached report. Salary for 2019 graduates was $29,275. 21% reporting (5 of 24 graduates). **Classification:** Criterion Met **Related Documents:** CET salary 2008 2009.pdf			1 - No Action Required

SUMMARY OF PDET COURSE OUTCOMES

PDET 311	**Seminar in Product Design**
Design Constraint Identification	Student will be able to identify the most important design constraints in a selected product.
Presentation of Design Information	Student will present design information in an oral presentation
Design concept development	Student will develop a design concept for a mechanical product to meet specific design constraints.
PDET 312	**Advanced Tolerancing**
OC1 -Geometric Characteristic Recognition	Identify the 14 geometric characteristics by name and symbol
OC2 - Geometric Characteristic Interpretation	Interpret geometric characteristics and the associated tolerances as applied on a drawing.
OC3 - Geometric Tolerancing Application	Apply geometric tolerances to various components to ensure concise communication of design requirements.
OC4 - Location Tolerance Application	Apply location tolerances to ensure the fit of mating components and fully define features for manufacturing.
PDET 321	**Applied Mechanics-Kinematics**
Terminology and vector mathematics	Students will demonstrate mastery of relevant terminology and mathematics.
Kinematic analysis	Students will demonstrate the ability to apply kinematic analysis to linear, rotational and general plane motion of mechanical components and mechanisms.
Kinetic analysis	Students will demonstrate the ability to apply kinetic analysis to linear, rotational and general plane motion of mechanical components and mechanisms.
PDET 322	**Model - Prototype Development**
OC1 - Parametric modeling	Be able to generate parametric models of individual mechanical components.
OC 2 - Create Engineering Drawing	Be able to develop engineering drawings of mechanical components based on model data.
OC 3 - Assembly model creation	Be able to Generate Assembly models using part models of mechanical components.

PDET 411	**Machine Design**
Design for static loading	Design machine components for strength & deflection - static loading
Design machine components for cyclic loading	Students will be able to design machine components for cyclic loading.
Design Machine Columns	Students will be able to design machine columns using both Euler and Johnson criteria.
Design Machine shafts	Students will be able to design machine shafts for typical loading.
Design Sliding Bearings	Students will be able to design sliding bearings for machine applications.
Select Rolling Element Bearings	Students will be able to select correct rolling element bearings for machine applications.

PDET 412	**Statistics - Ergonomics**
OC1 - Use Probability Density Curve	Ability to use the probability density curve to identify design characteristics of a specific target population.
OC2 - Ergonomic Design Principles	Understand and use ergonomic design principles to establish design parameters for a product.
OC3 - Anthropometric principles	Use anthropometric principles to define constraints imposed by the limitation of human movement.

PDET 413	**Applied Fluids - Thermodynamics**
Terminology	Students will understand terminology relevant to Thermodynamics and Fluid power.
Closed system analysis	Student will be able to apply work energy and power concepts to closed thermodynamic systems.
Open system analysis	Student will be able to apply work energy and power concepts to open thermodynamic systems.
Heat Transfer	Students will be able to apply heat transfer concepts to analyze heat transfer through various media.
Fluid Power concepts	Students will apply fluid power concepts in the analysis of hydraulic systems.

PDET 415	**Advanced Solid Modeling CAD**
CO 1 - Generate complex components	Generate complex parts and assemblies of mechanical components using advanced techniques in parametric modeling
CO 2 - Completion of team projects	Ability to conceptualize and complete models and assemblies in a team environment.
CO 3 - Complete individual models	Ability to complete models from individual design concepts
CO 4 - Use surfacing techniques to create models	Use surfacing techniques to create mechanical components with complex shapes.
CO 5 - Generate computer renderings	Use lighting and room manipulation to generate a computer rendering of a mechanical system.

PDET 422	**Advanced Machine Design**
FEA Machine Design	Students will design machine components using Finite Element Analysis.
Machine Connections	Students will design/select permanent and removable fastening solutions for connecting machine components.
Mechanical Drive Trains	Students will demonstrate the ability to select/design mechanical drive trains including of belts gears and chains.

PDET 499	**Product Design Project**
Mechanical design development	Students will demonstrate the ability to apply engineering principles in the development of mechanical designs from initial concept through a realization suitable for manufacture.
Computer Aided Design	Students will demonstrate the ability to document mechanical designs using Computer Aided Design (CAD).
Technical presentation	Students will demonstrate the ability to present design concepts and realizations via formal technical presentation.
Written Technical communication	Students will demonstrate ability to present design concepts and realizations in written form.
Fundamental Technical Knowledge	Students will demonstrate a fundamental knowledge of mathematics, physical sciences and engineering science applicable to the design of mechanical products.

PRODUCT DESIGN ENGINEERING TECHNOLOGY ASSEESSMENT SUMMARY

INITIAL PROGRAM ASSESSMENT

Background

The Product Design Engineering Technology Program has five learning outcomes. These outcomes are measured as part of the program capstone course conducted each spring semester which is taken by students who have completed the program course content. The five learning outcomes are;

1. The student will demonstrate the ability to apply engineering principles in the development of mechanical designs from initial concept through realization suitable for manufacturing.

2. Students will demonstrate the ability to document mechanical designs using Computer Aided Design (CAD).

3. Students will demonstrate the ability to present design concepts and realizations via formal oral presentations.

4. Students will demonstrate the ability to present design concepts and realizations in written form.

5. Students will demonstrate a fundamental knowledge of mathematics, physical sciences and engineering science applicable to the design of mechanical products.

This summary is the initial evaluation of the measures of these outcomes and is based on three years of data collected in May 2010, May 2011 and May 2012. Data providing additional detail for each outcome presented here can found as part of the assessment documentation collected for the PDET 499 Capstone Course.

Evaluation of Outcome 1

This outcome is evaluated using the capstone formal report submitted by each student at the conclusion of the PDET program capstone course. Selected sections of the report, indicating the ability to apply engineering principles in the development of mechanical designs from initial concept through realization suitable for manufacturing, are evaluated to determine the level of success for this outcome. A score of 70% or better on the total score of these subsections is required for success.

	2010	2011	2012
Class Average	90.2 %	83.8 %	92 %
# succeeding	20	9	24
# evaluated	21	12	31
% of sucess	95 %	75 %	77 %

Program Faculty Evaluation

This measure does not seem to indicate any consistent trend of a magnitude adequate for analysis. There also seems to be little linkage between the class average and the number of successful students. The program faculty cannot identify any class specific factor that could be considered causal in evaluating this outcome.

Planned Action

The program faculty will continue to monitor this outcome to determine when or if a significant trend should develop.

Evaluation of Outcome 2

This outcome is evaluated using the drawing and dimensioning sections of the capstone formal report submitted by each student at the conclusion of the PDET program capstone course. The selected sections of the report evaluated for this outcome, indicating the ability to prepare the CAD based documentation of assemblies and components for the senior product design, measure the ability to prepare engineering drawings using solid modeling software. Student drawings are evaluated for compliance to industry standards for the documentation of mechanical parts as well as proper tolerance definition. A score of 70% or better on the total score of these subsections is required for success.

	2010	2011	2012
Class Average	71 %	73.9 %	74.8 %
# succeeding	14	4	13
# evaluated	21	12	31
% of sucess	67 %	67 %	58 %

Program Faculty Evaluation

While relatively low, this measure seems to be consistent. Outcome 3 would seem to be primarily influenced by PDET 322 and PDET 415 course performance. Therefore the metrics for those courses should be reviewed in order to determine if a specific problem area or corrective action can be identified.

Planned Action

The program faculty will review PDET 322 and PDET 415 and determine if a cause of the low performance on this outcome can be identified.

Evaluation of Outcome 3

This outcome is evaluated using the formal presentation made by each student describing their senior product development project. This presentation is made by each student to a review committee comprised of faculty and engineering professionals. The evaluation score for the presentation reflects the student's ability to define design project objectives, describe the methods used to develop the design, present the analysis used in the design development and to accurately describe the estimated cost of the product. A score of 70% or better on the presentation is required for success.

	2010	2011	2012
Class Average	83.3 %	84.2 %	90.3 %
# succeeding	21	12	31
# evaluated	21	12	31
% of sucess	100%	100 %	100 %

Program Faculty Evaluation

This measure indicates a consistent and excellent result.

Planned Action

None

Evaluation of Outcome 4 - Written Communication

This outcome is based on the overall evaluation of the written quality of the student's formal project report describing the design activities of the senior design project. Factors used in evaluating this outcome are clarity, grammar, spelling, word choice, proper tense and person. In addition a portion of the evaluation is based on the report's compliance to the required format. The student receives a score reflecting their writing proficiency with a score of 70% or better on the total score of these subsections required for success.

	2010	2011	2012
Class Average	79.9 %	81.3 %	78.2 %
# succeeding	18	11	23
# evaluated	21	12	31
% of sucess	86%	92 %	74 %

Program Faculty Evaluation

This measure does not seem to indicate any consistent trend of a magnitude adequate for analysis. The program faculty has identified the primary courses responsible for this measure as the required courses in English composition. The terminal course in this sequence is ENGL 321 or ENGL 311. Since approximately the 2007 academic year, PDET students do not share a common section for this course and no outcome data is available at this time for any of the ENGL 311 or 321 course sections.

Planned Action

The program faculty will continue to monitor this outcome for any significant change and to evaluate further when assessment data becomes available for ENGL 311 and 321.

Evaluation of Outcome 5

This outcome is evaluated using the capstone formal report submitted by each student at the conclusion of the PDET program capstone course. Selected sections of the report, indicating the fundamental knowledge of mathematics, the physical sciences and engineering science applicable to the design of mechanical products are used to evaluate this outcome. A score of 70% or better on the total score of these subsections is required for success.

	2010	2011	2012
Class Average	90,2 %	83.8 %	86.2 %
# succeeding	20	9	12
# evaluated	21	12	31
% of success	95%	75 %	68 %

Program Faculty Evaluation

This measure does not seem to indicate any consistent trend of a magnitude adequate for analysis. The measure is also inherently somewhat subjective and, while the number of unsuccessful students has varied, the class average has remained relatively stable. Indications are that those students not receiving a score of 70% are grouped below acceptable level and that the class distribution of scores is bi-modal in nature.

Planned Action

The program faculty will continue to monitor this outcome to determine when or if a significant trend develops or if other probable causations can be identified.

Summary Program Evaluation for 2011-2012

The review of the assessment data used to evaluate the five outcomes for the Product Design Engineering Technology program is complicated by several factors. Most important is the statistically small number of students in each class year. This necessitates using data taken from a number of years to expose only the most significant changes and trends. The observations taken from a number of years however are complicated by a lack of uniformity in that class composition with respect to capability and background and can vary significantly year to year. Since students enter the program from a variety of preparatory paths (FSU technical AS degree, Community College technical AS degree, FSU non-technical AS degree, etal) each class year typically presents a high degree of variation in prior experience which can directly impact student performance in the program.

An additional complicating factor for this assessment is the lack of assessment data from supporting courses. The Product Design program has a large number of supporting courses from other areas in the College of Engineering Technology and the College of Arts & Sciences. At the time of this review, only a few of these courses have defined outcomes available within the FSU assessment system and no supporting courses have data presenting the assessment results associated with the outcomes that have been defined. This makes it difficult to evaluate the performance on some Product Design outcomes that have a curriculum link to these supporting courses.

Conclusion

Overall the assessment results through May 2012 indicate to the program faculty that the program is performing reasonably well academically. Some areas of weakness can be identified however and these will be monitored on a periodic basis until a probable causation can be determined. No program level changes can be identified by the program faculty at this time and no major course or curriculum changes are planned.

Product Design Engineering Technology • *Bachelor of Science*

Why Choose Product Design Engineering Technology?

The Product Design Engineering Technology program at Ferris offers intensive instruction and practical experience in all facets of product design. Students are prepared to effectively participate in a design environment, generate conceptual design sketches and drawings, create complex design layouts, perform static and dynamic analysis, create models and prototypes, create and define complex surfaces and shapes, and understand and integrate manufacturing principles into design.

Study also emphasizes communication, mathematics and analytical skills. Students receive extensive hands-on experience through labs and internships to give them real-world experience.

Career Opportunities

A product designer begins with a concept, then transforms it into a working design that specifies the size, shape, style, dimensions and materials needed. Because this skill is needed for the production of millions of industrial and consumer goods, designers are in great demand.

Their knowledge of design, engineering analysis, manufacturing processes and communication techniques are valued in industries across the United States. Employment opportunities exist across the spectrum of the product design field wherever products are produced, designers will be found.

Specific job titles might include product designer, layout drafter, project manager, product developer, computer-aided designer, mechanical designer, project engineer, and design engineer.

Admission Requirements

Students entering the program must have completed a minimum of 60 transferrable semester hours with a minimum overall GPA of 2.5. The following specific courses are required for admission and may be included in the total transferable credit hours:

English Composition I & II
Basic Public Speaking
Mathematics through Pre-Calculus
General Physics I (with lab.)
Basic Material Science
Introductory Computer Aided Design
Cultural Enrichment - 3 credit hours
Social Awareness - 3 credit hours

Admission counselors or program advisors should be consulted for an evaluation of transferability and course equivalency. Under special circumstances students with exceptional academic records can be admitted to the program before all pre-admission requirements are completed.

Graduation Requirements

The Product Design Engineering Technology program at Ferris leads to a bachelor of science degree. Graduation requires a minimum 2.0 GPA in core classes, in the major and overall. Students must complete all general education requirements as outlined on the General Education website.

Required Courses		Credit Hours
General Education		
ARTS 101	Basic Art	3
CHEM 103	Preparatory Chemistry	3
ENGL 321	Advanced Composition	3
MATH 216	Applied Calculus	4
GEOG 100	Geography of World Regions	3
Elective:	Social Awareness (200 level)	3
Elective:	Cultural Enrichment (200 level)	3
Major		
COMM 336	Tech and Prof Presentation	3
EEET 201	Electrical Fundamentals	3
MATL 341	Material Selection Metals	3
MECH 340	Statics-Strength of Materials	4
MFGE 352	Design For Manufacturing	2
PDET 311	Seminar in Product Design	1
PDET 312	Advanced Tolerancing	2
PDET 321	Applied Mechanics-Kinematics	3
PDET 322	Model - Prototype Development	2
PLTS 342	Plastic Material Select-PDET	3
PDET 411	Machine Design	3
PDET 412	Statistics - Ergonomics	2
PDET 413	Applied Fluids - Thermodynam	3
PDET 415	Advanced Solid Modeling CAD	2
PDET 422	Advanced Machine Design	4
PDET 499	Product Design Project	3
Minimum credit hours required for B.S. degree (after completion of admission requirements)		65

More Information
College of Engineering Technology
Ferris State University
919 Campus Drive, SWN 405
Big Rapids, MI 49307-2280
or call (231) 591-2755

APPENDIX D

Graduate follow-up survey

Employer follow-up survey

Graduate follow-up survey

FERRIS STATE UNIVERSITY
Imagine More

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. Thank you for taking the time to complete this survey. Your answers will be of great help in determining the future direction of the program.

About Your Product Design Education

1. Based on your experiences since graduation, how important have the specific content areas of the Product Design academic program listed below been in your employment.

	Not Applicable /Do Not Use	Very Unimportant	Somewhat Unimportant	Somewhat Important	Very Important
Advanced GD&T	○	○	○	○	○
Statics & Strengths of Materials	○	○	○	○	○
Electronics	○	○	○	○	○
Art	○	○	○	○	○
Dynamics	○	○	○	○	○
Ergonomics	○	○	○	○	○
Plastics Material Selection	○	○	○	○	○
Applied Calculus	○	○	○	○	○
Machine Design	○	○	○	○	○
World Geography	○	○	○	○	○
Thermodynamics	○	○	○	○	○
Metals Materials Selection	○	○	○	○	○
Advanced Composition	○	○	○	○	○
Technical Presentations	○	○	○	○	○
Finite Element Analysis (FEA)	○	○	○	○	○
CAD Solid Modeling	○	○	○	○	○
Senior Design Project	○	○	○	○	○

Your Opinions on Miscellaneous Topics

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.

2. **Should the PDET program become an engineering rather than an engineering technology program?**

- Yes
- No

3. **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.

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

- Yes
- No

5. **Should the PDET program make the necessary changes to become ABET accredited?**

- Yes
- No

6. **Based on your experience, would you recommend PDET students to join a professional organization before graduation? (Such as SAE, ASME, etc.)**

- Yes
- No

7. **Which organization(s) would you recommend?**

8. **How important to mechanical design is the ability to create renderings and sketches of products by free hand drawing?**

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

About Yourself

Please note that this information is 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.

9. **Name**

10. **Company you currently work for**

11. **Title**

12. **City and state where you work**

13. **What year did you graduate from the Design program?**

14. **What was your area of study before starting the Product Design program?**

15. **Where did you take most of your college courses before starting the Product Design program?**

16. **Did you take most of your PDET courses on campus or off campus?**

- ○ On campus
- ○ Off campus

17. **Have you completed any college coursework since leaving FSU?**

- ○ Yes
- ○ No

18. **What was your area of study?**

19. **From which college or university did you take classes?**

20. **What was your starting annual salary after graduation?**

- $15,000-$20,999
- $21,000-$25,999
- $26,000-$30,999
- $31,000-$35,999
- $36,000-$40,999
- $41,000-$45,999
- $46,000-$50,999
- $51,000-$55,999
- $56,000-$60,999
- $61,000-$65,999
- $66,000-$70,999
- $71,000-$75,999
- $76,000-$80,999
- $81,000-$85,999
- $86,000-$90,999
- $91,000-$95,999
- $96,000-$99,999
- $100,000 or more

21. **What is your current annual salary?**

- Less than $19,999
- $20,000-$24,999
- $25,000-$29,999
- $30,000-$39,999
- $40,000-$49,999
- $50,000-$59,999
- $60,000-$69,999
- $70,000-$79,999
- $80,000-$89,999
- $90,000-$99,999
- $100,000-$125,000
- More than $125,000

22. **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:

23. **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

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

- ○ Very Dissatisfied
- ○ Somewhat Dissatisfied
- ○ Somewhat Satisfied
- ○ Very Satisfied

25. **What was the most valuable aspect of the PDET program? This may be a specific course or courses or a general aspect of the program.**

26. **What was the least valuable aspect of the PDET program?**

27. **Please use 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.

Employer follow-up survey

FERRIS STATE UNIVERSITY
Imagine More

Product Design Engineering Technology Employer/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. Thank you for taking the time to complete this survey. Your answers will be of great help in determining the future direction of the program.

1. **Approximately how many employees work at this facility?**

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

2. **Approximately how many mechanical engineers/designers work at this facility?**

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

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

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

Please Specify:

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

- Yes
- No
- Unknown

5. **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

6. **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					
Design for Manufacturing					
Machine Design					
Thermodynamics					
Fluid Mechanics					
Basic Electronics					
CAD Solid Modeling					
Ergonomics					
Statistics					
Manual Sketching					
Industrial Psychology					
Applied Calculus					

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

- ☐ AUTOCAD
- ☐ PRO-E
- ☐ CATIA
- ☐ UNIGRAPHICS/Solid Edge
- ☐ 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.

8. **Overall, how important do you feel this activity is?**

- ○ Very Unimportant
- ○ Somewhat Unimportant
- ○ Somewhat Important
- ○ Very Important

9. **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	○	○	○	○

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

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

11. **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

12. **Are you familiar with the differences between Engineering and Engineering Technology BS degree programs?**

- Yes
- No

13. **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

14. **Are you familiar with ABET-TAC and ABET-EAC accreditation?**

- Yes
- No

15. **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.

APPENDIX E

Graduate Follow-up Survey frequencies

Employer Follow-up Survey frequencies

Graduate Follow-up Survey frequencies

PDET APR...Alumni

Frequencies

Prepared by: Institutional Research & Testing, 04/13

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing			
q1.a Advanced GD&T	8	0	3.75	4.00	1.389
q1.b Statics & Strengths of Materials	8	0	3.88	4.00	1.356
q1.c Electronics	8	0	3.13	3.50	1.126
q1.d Art	8	0	2.50	3.00	1.309
q1.e Dynamics	8	0	3.63	4.00	1.302
q1.f Ergonomics	8	0	3.63	4.00	1.302
q1.g Plastics Material Selection	8	0	4.13	4.50	1.356
q1.h Applied Calculus	8	0	2.38	2.00	1.188
q1.i Machine Design	8	0	4.25	5.00	1.488
q1.j World Geography	8	0	2.25	2.00	1.035
q1.k Thermodynamics	8	0	3.63	4.00	1.188
q1.l Metals Materials Selection	8	0	4.25	5.00	1.389
q1.m Advanced Composition	8	0	3.13	3.50	1.126
q1.n Technical Presentations	8	0	4.00	4.00	.756
q1.o Finite Element Analysis (FEA)	8	0	3.75	4.00	1.389
q1.p CAD Solid Modeling	8	0	4.88	5.00	.354
q1.q Senior Design Project	8	0	4.38	5.00	1.408
q2 Should become engineering rather than eng tech prog	8	0	1.63	2.00	.518
q3 Being a grad of eng tech rather than eng prog been limitation	8	0	1.75	2.00	.463
q4 Being a grad of a non-ABET accredited eng tech prog been limitation	8	0	1.75	2.00	.463
q5 Should become ABET accredited	8	0	1.63	2.00	.518

q6 Recommend students join prof org before graduation	8	0	1.38	1.00	.518
q7 Which organization(s) would you recommend	8	0			
q8 How important is ability to create renderings/sketches by free hand drawing	8	0	2.38	2.00	.518
q9 Name	8	0			
q10 Company you currently work for	8	0			
q11 Title	8	0			
q12 City and state where you work	8	0			
q13 Year of graduation	8	0			
q14 Area of study before PDET	8	0			
q15 Where take most college courses before starting PDET	8	0			
q16 Take most PDET courses on or off campus	8	0	1.50	1.50	.535
q17 Completed any college coursework since leaving FSU	8	0	2.00	2.00	.000
q18 Area of student	8	0			
q19 College/university	8	0			
q20 Starting annual salary after graduation	7	1	7.14	6.00	2.410
q21 Current annual salary	7	1	6.71	7.00	1.496
q22_1 Current position: Design	8	0	.88	1.00	.354
q22_2 Current position: Sales/Marketing	8	0	.00	.00	.000
q22_3 Current position: Project/Product Management	8	0	.50	.50	.535
q22_4 Current position: Technical Management (of an engineering dept. or section)	8	0	.13	.00	.354
q22_5 Current position: General Management (of a facility, company, division, etc.)	8	0	.00	.00	.000
q22_6 Current position: Other	8	0	.13	.00	.354
q22.a Other specified	8	0			
q23 Agree with statement had easy time finding first job after graduation	8	0	2.88	3.00	1.246
q24 Overall, how satisfied are you wtih PDET education	8	0	3.13	3.00	.835

q25 Most valuable aspects of prog	8	0			
q26 Least valuable aspects of prog	8	0			
q27 Additional program changes/comments	8	0			

Frequency Table

q1.a Advanced GD&T

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Somewhat Unimportant	2	25.0	25.0	37.5
	Somewhat Important	2	25.0	25.0	62.5
	Very Important	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

q1.b Statics & Strengths of Materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Somewhat Unimportant	1	12.5	12.5	25.0
	Somewhat Important	3	37.5	37.5	62.5
	Very Important	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

q1.c Electronics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Very Unimportant	1	12.5	12.5	25.0
	Somewhat Unimportant	2	25.0	25.0	50.0

	Somewhat Important	4	50.0	50.0	100.0
	Total	8	100.0	100.0	

q1.d Art

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	3	37.5	37.5	37.5
	Somewhat Unimportant	3	37.5	37.5	75.0
	Somewhat Important	2	25.0	25.0	100.0
	Total	8	100.0	100.0	

q1.e Dynamics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Somewhat Unimportant	2	25.0	25.0	37.5
	Somewhat Important	3	37.5	37.5	75.0
	Very Important	2	25.0	25.0	100.0
	Total	8	100.0	100.0	

q1.f Ergonomics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Somewhat Unimportant	2	25.0	25.0	37.5
	Somewhat Important	3	37.5	37.5	75.0
	Very Important	2	25.0	25.0	100.0
	Total	8	100.0	100.0	

q1.g Plastics Material Selection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Somewhat Important	3	37.5	37.5	50.0
	Very Important	4	50.0	50.0	100.0
	Total	8	100.0	100.0	

q1.h Applied Calculus

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	2	25.0	25.0	25.0
	Very Unimportant	3	37.5	37.5	62.5
	Somewhat Unimportant	1	12.5	12.5	75.0
	Somewhat Important	2	25.0	25.0	100.0
	Total	8	100.0	100.0	

q1.i Machine Design

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Somewhat Unimportant	1	12.5	12.5	25.0
	Very Important	6	75.0	75.0	100.0
	Total	8	100.0	100.0	

q1.j World Geography

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	2	25.0	25.0	25.0
	Very Unimportant	3	37.5	37.5	62.5
	Somewhat Unimportant	2	25.0	25.0	87.5
	Somewhat Important	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q1.k Thermodynamics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Somewhat Unimportant	1	12.5	12.5	25.0
	Somewhat Important	5	62.5	62.5	87.5
	Very Important	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q1.l Metals Materials Selection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Somewhat Important	2	25.0	25.0	37.5
	Very Important	5	62.5	62.5	100.0
	Total	8	100.0	100.0	

q1.m Advanced Composition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Very Unimportant	1	12.5	12.5	25.0
	Somewhat Unimportant	2	25.0	25.0	50.0
	Somewhat Important	4	50.0	50.0	100.0
	Total	8	100.0	100.0	

q1.n Technical Presentations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Unimportant	2	25.0	25.0	25.0
	Somewhat Important	4	50.0	50.0	75.0

	Very Important	2	25.0	25.0	100.0
	Total	8	100.0	100.0	

q1.o Finite Element Analysis (FEA)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Somewhat Unimportant	2	25.0	25.0	37.5
	Somewhat Important	2	25.0	25.0	62.5
	Very Important	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

q1.p CAD Solid Modeling

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	1	12.5	12.5	12.5
	Very Important	7	87.5	87.5	100.0
	Total	8	100.0	100.0	

q1.q Senior Design Project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable/Do Not Use	1	12.5	12.5	12.5
	Somewhat Important	1	12.5	12.5	25.0
	Very Important	6	75.0	75.0	100.0
	Total	8	100.0	100.0	

q2 Should become engineering rather than eng tech prog

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	37.5	37.5	37.5

	No	5	62.5	62.5	100.0
	Total	8	100.0	100.0	

q3 Being a grad of eng tech rather than eng prog been limitation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	25.0	25.0	25.0
	No	6	75.0	75.0	100.0
	Total	8	100.0	100.0	

q4 Being a grad of a non-ABET accredited eng tech prog been limitation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	25.0	25.0	25.0
	No	6	75.0	75.0	100.0
	Total	8	100.0	100.0	

q5 Should become ABET accredited

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	37.5	37.5	37.5
	No	5	62.5	62.5	100.0
	Total	8	100.0	100.0	

q6 Recommend students join prof org before graduation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	62.5	62.5	62.5
	No	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

q7 Which organization(s) would you recommend

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	50.0	50.0	50.0
	any would be good, I think it depends on what field the individual will be going into	1	12.5	12.5	62.5
	ASME	1	12.5	12.5	75.0
	SAE	1	12.5	12.5	87.5
	SPE, SME	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q8 How important is ability to create renderings/sketches by free hand drawing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Useful, but not important	5	62.5	62.5	62.5
	Very important	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

q9 Name

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Adam Meeuwsen	1	12.5	12.5	12.5
	Dan Stanhope	1	12.5	12.5	25.0
	Dave Bearce	1	12.5	12.5	37.5
	Dave Iorkowski	1	12.5	12.5	50.0
	Erik R Knivila	1	12.5	12.5	62.5
	Ron Woltjer	1	12.5	12.5	75.0
	Sean Michael Sapino	1	12.5	12.5	87.5
	Stuart Baker	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q10 Company you currently work for

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aar mobility	1	12.5	12.5	12.5
	Andronaco Industries	1	12.5	12.5	25.0
	Broadview Product Development	1	12.5	12.5	37.5
	Hilite International	1	12.5	12.5	50.0
	Mid-America Machining	1	12.5	12.5	62.5
	North American Lighting, Inc.	1	12.5	12.5	75.0
	TLX Technologies	1	12.5	12.5	87.5
	unemployed	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q11 Title

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Designer	2	25.0	25.0	25.0
	Development Engineer	1	12.5	12.5	37.5
	Mold Designer I	1	12.5	12.5	50.0
	Product Design Engineer	1	12.5	12.5	62.5
	Product Design Engineer/Produc Engineer	1	12.5	12.5	75.0
	Tooling Engineer	1	12.5	12.5	87.5
	unemployed	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q12 City and state where you work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Brooklyn, MI	1	12.5	12.5	12.5
	Cadillac mi	1	12.5	12.5	25.0
	Evansville, IN	1	12.5	12.5	37.5
	I live in Grand Rapids, MI	1	12.5	12.5	50.0
	Kentwood, Michigan	1	12.5	12.5	62.5

	Pewaukee, WI	1	12.5	12.5	75.0
	Whitehall Michigan	1	12.5	12.5	87.5
	Zeeland Michigan	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q13 Year of graduation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2006	5	62.5	62.5	62.5
	2009	1	12.5	12.5	75.0
	2011	1	12.5	12.5	87.5
	May, 2012	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q14 Area of study before PDET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cad Designer	1	12.5	12.5	12.5
	CAD Drafting And Tool Design	1	12.5	12.5	25.0
	CAD Drafting/Tool Design	1	12.5	12.5	37.5
	CAD/Tool Design	1	12.5	12.5	50.0
	Machine Tooling Tech at Ferris	1	12.5	12.5	62.5
	Mechanical Drafting	1	12.5	12.5	75.0
	Mechanical engineering	1	12.5	12.5	87.5
	Plastics Technology and Mechanical drafting/design	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q15 Where take most college courses before starting PDET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Delta college	1	12.5	12.5	12.5

	Ferris	1	12.5	12.5	25.0
	Ferris in Big Rapids	1	12.5	12.5	37.5
	Ferris State University	2	25.0	25.0	62.5
	Grand Rapids Junior College	1	12.5	12.5	75.0
	GRCC	1	12.5	12.5	87.5
	Muskegon Community College	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q16 Take most PDET courses on or off campus

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	On campus	4	50.0	50.0	50.0
	Off campus	4	50.0	50.0	100.0
	Total	8	100.0	100.0	

q17 Completed any college coursework since leaving FSU

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	8	100.0	100.0	100.0

q18 Area of student

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	100.0	100.0	100.0

q19 College/university

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	100.0	100.0	100.0

q20 Starting annual salary after graduation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	$36,000-$40,999	2	25.0	28.6	28.6
	$41,000-$45,999	2	25.0	28.6	57.1
	$46,000-$50,999	1	12.5	14.3	71.4
	$61,000-$65,999	1	12.5	14.3	85.7
	$66,000-$70,999	1	12.5	14.3	100.0
	Total	7	87.5	100.0	
Missing	System	1	12.5		
Total		8	100.0		

q21 Current annual salary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	$40,000-$49,999	2	25.0	28.6	28.6
	$50,000-$59,999	1	12.5	14.3	42.9
	$60,000-$69,999	2	25.0	28.6	71.4
	$70,000-$79,999	1	12.5	14.3	85.7
	$80,000-$89,999	1	12.5	14.3	100.0
	Total	7	87.5	100.0	
Missing	System	1	12.5		
Total		8	100.0		

q22_1 Current position: Design

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	1	12.5	12.5	12.5
	Selected	7	87.5	87.5	100.0
	Total	8	100.0	100.0	

q22_2 Current position: Sales/Marketing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	8	100.0	100.0	100.0

q22_3 Current position: Project/Product Management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	4	50.0	50.0	50.0
	Selected	4	50.0	50.0	100.0
	Total	8	100.0	100.0	

q22_4 Current position: Technical Management (of an engineering dept. or section)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	7	87.5	87.5	87.5
	Selected	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q22_5 Current position: General Management (of a facility, company, division, etc.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	8	100.0	100.0	100.0

q22_6 Current position: Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	7	87.5	87.5	87.5
	Selected	1	12.5	12.5	100.0

	Total	8	100.0	100.0	

q22.a Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		6	75.0	75.0	75.0
	design and develop all new products, tooling and processes from concept to production	1	12.5	12.5	87.5
	unemployed	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q23 Agree with statement had easy time finding first job after graduation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	25.0	25.0	25.0
	Somewhat Agree	3	37.5	37.5	62.5
	Strongly Agree	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

q24 Overall, how satisfied are you wtih PDET education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	2	25.0	25.0	25.0
	Somewhat Satisfied	3	37.5	37.5	62.5
	Very Satisfied	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

q25 Most valuable aspects of prog

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	12.5	12.5	12.5
	All engineering classes	1	12.5	12.5	25.0
	All of the engineering courses being being taught in an applied fashion rather than the theoretical. It lends a greater mechanical understanding.	1	12.5	12.5	37.5
	GD&T, Solid Modeling, FEA, Statics and strength of materials, Plastics, Material Selection, Professional presentations, and the Senior project is exactly what I am doing with my current job.	1	12.5	12.5	50.0
	I particularly enjoyed the "hands-on" aspect of the core instruction/classwork.	1	12.5	12.5	62.5
	Pro engineer	1	12.5	12.5	75.0
	The course as a whole gives you a great foundation to start your career on no matter what field you may find yourself in after graduation. From design, to lower level management, every course gives you a terrific understanding of any number of situations that you may find yourself in once you have been employed in some type of engineering position.	1	12.5	12.5	87.5
	The machine design classes and material selection classes have been the most valuable to me. One of the things that sets an engineering technology course apart is the broader background and overview of manufacturing. I think this is missed in most accredited programs because of all the math requirements. I think this is something that sets the Product Design program apart and should not be lost. Fancy math calculations are no good if I can't get the part out of a mold or the tooling cost is way to expensive.	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q26 Least valuable aspects of prog

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	12.5	12.5	12.5
	Applied Calculus	1	12.5	12.5	25.0
	Art	1	12.5	12.5	37.5
	Basic Art was a complete waste of time, as was COMM 336 (Tech. Presentations). A course on how to use MS powerpoint would have been more useful.	1	12.5	12.5	50.0
	Geography, ART, history,	1	12.5	12.5	62.5
	I can't really say, every core class of the curriculum was beneficial.	1	12.5	12.5	75.0
	If there is any way to drop unrelated requirements like social awareness or cultural enrichment classes and pick up more manufacturing and electronics classes it would help, but I am not sure this is something the school would let you do.	1	12.5	12.5	87.5
	Psyc. classes	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

q27 Additional program changes/comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	25.0	25.0	25.0
	During the GD&T courses focus more on every Geometric tolerance more than just position and perpendicularity, which are closely related anyway. I use cylindricity, total run out and profile of a surface alot at my job. Other than that all other courses have helped me in my career thus far.	1	12.5	12.5	37.5

	I think that it would be beneficial to offer internships for PDET students like the ones that are available to most of the other engineering technology programs at FSU.	1	12.5	12.5	50.0
	I think there are advantages to having an ABET accredited program but I think I is beneficial to have a more hands on program that is less theory as well. I would leave the product design program the way it is and let the Mech Eng prog carry any accreditation. I think there is an advantage to having both at the same university, it gives students a broader range of options. I would be interested in helping review the senior projects again as well. please contact me at adamm@broadviewproduct.com if you need any extra people.	1	12.5	12.5	62.5
	More real life/lab work.	1	12.5	12.5	75.0
	Questions 20 & 23 are kind of skewed due to the fact that I was already working full time in engineering at the time I was taking classes and graduated. However I am thankful for the education I got from FSU. A few years after graduating the company I worked at for 20 years closed their doors. If it wasn't for my degree at FSU I wouldn't be as employable as I am today. Thank you FSU!	1	12.5	12.5	87.5
	Very proud to say that I studied PDET at Ferris State. Though not too many people have heard of the university or the program, my supervisors tell me all the time how impressed they are with the abilities that I have at such a young age, I have the PDET courses and professors to thank for that.	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

Employer Follow-up Survey frequencies

PDET APR Employer Frequencies

Prepared by: Institutional Research & Testing, 07/13

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing			
q1 How many employees	15	0	3.00	3.00	1.363
q2 How many mechanical engineers/designers	15	0	3.40	2.00	1.805
q3_1 Primary activity: Manufacturing	15	0	.80	1.00	.414
q3_2 Primary activity: Design	15	0	.67	1.00	.488
q3_3 Primary activity: Consulting	15	0	.07	.00	.258
q3_4 Primary activity: Other	15	0	.00	.00	.000
q3.a Other specified	15	0			
q4 Have one or more FSU PDET grads on staff	15	0	1.27	1.00	.458
q5 How well grad(s) prepared to work for company	11	4	3.55	4.00	.522
q6.a Geometric Dimensioning & Tolerancing	15	0	4.40	5.00	.737
q6.b Basic Material Science	15	0	4.40	4.00	.632
q6.c Designing with Plastics	15	0	3.60	4.00	1.454
q6.d Designing with Metals	15	0	4.47	5.00	.834
q6.e Engineering Statics	15	0	4.60	5.00	.507
q6.f Engineering Dynamics	15	0	3.60	4.00	1.404
q6.g Chemistry	15	0	2.60	2.00	1.183
q6.h Physics	15	0	3.93	4.00	.961
q6.i Finite Element Analysis	15	0	4.40	4.00	.507
q6.j Design for Manufacturing	15	0	4.87	5.00	.352
q6.k Machine Design	15	0	4.13	4.00	.990
q6.l Thermodynamics	15	0	3.33	3.00	1.175
q6.m Fluid Mechanics	15	0	3.07	4.00	1.280
q6.n Basic Electronics	15	0	3.20	4.00	1.265
q6.o CAD Solid Modeling	15	0	5.00	5.00	.000

q6.p Ergonomics	15	0	3.67	4.00	1.175
q6.q Statistics	15	0	3.47	4.00	1.246
q6.r Manual Sketching	14	1	3.43	4.00	1.284
q6.s Industrial Psychology	14	1	2.86	2.50	1.231
q6.t Applied Calculus	14	1	3.00	3.50	1.177
q7_1 Software: AUTOCAD	15	0	.20	.00	.414
q7_2 Software: PRO-E	15	0	.47	.00	.516
q7_3 Software: CATIA	15	0	.13	.00	.352
q7_4 Software: UNIGRAPHICS/Solid Edge	15	0	.20	.00	.414
q7_5 Software: SOLID WORKS	15	0	.47	.00	.516
q7_6 Software: Other	15	0	.20	.00	.414
q7.a Other specified	15	0			
q8 Overall, how important is the design project	15	0	3.53	4.00	1.060
q9.a Proposal Preparation	15	0	3.60	4.00	.828
q9.b Estimating and Budgeting	15	0	3.27	3.00	.799
q9.c Written Status Reporting	15	0	3.40	4.00	.737
q9.d Conducting Design Reviews	15	0	3.93	4.00	.258
q9.e Formal Written Report	15	0	3.27	4.00	.961
q9.f Technical Presentation	15	0	3.87	4.00	.352
q9.g Project Management	15	0	3.80	4.00	.414
q9.h Prototype Development	15	0	3.60	4.00	.910
q10 Diffuclty hiring qualified mechanical designers	15	0	1.93	2.00	.961
q11 Best estimate describing growth potential at company	15	0	2.53	3.00	.516
q12 Familiar with the differences between Engineering & Eng Tech	15	0	1.07	1.00	.258
q13 Type of degree prefer	15	0	2.13	3.00	.990
q14 Familiar with ABET-TAC and ABET-EAC accreditation	15	0	1.73	2.00	.458
q15 Additional comments	15	0			

Frequency Table

q1 How many employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 50	3	20.0	20.0	20.0
	50-100	1	6.7	6.7	26.7
	101-500	7	46.7	46.7	73.3
	501-1000	1	6.7	6.7	80.0
	Over 1000	3	20.0	20.0	100.0
	Total	15	100.0	100.0	

q2 How many mechanical engineers/designers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-25	8	53.3	53.3	53.3
	26-50	2	13.3	13.3	66.7
	76-100	1	6.7	6.7	73.3
	Over 100	4	26.7	26.7	100.0
	Total	15	100.0	100.0	

q3_1 Primary activity: Manufacturing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	3	20.0	20.0	20.0
	Selected	12	80.0	80.0	100.0
	Total	15	100.0	100.0	

q3_2 Primary activity: Design

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Not Selected	5	33.3	33.3	33.3
	Selected	10	66.7	66.7	100.0
	Total	15	100.0	100.0	

q3_3 Primary activity: Consulting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	14	93.3	93.3	93.3
	Selected	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q3_4 Primary activity: Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	15	100.0	100.0	100.0

q3.a Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		12	80.0	80.0	80.0
	Automotive Metal Stampings	1	6.7	6.7	86.7
	Hotrunner components	1	6.7	6.7	93.3
	I work for General Motors so we design and manufacture vehicles.	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q4 Have one or more FSU PDET grads on staff

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	73.3	73.3	73.3
	No	4	26.7	26.7	100.0

	Total	15	100.0	100.0	

q5 How well grad(s) prepared to work for company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Prepared	5	33.3	45.5	45.5
	Very Prepared	6	40.0	54.5	100.0
	Total	11	73.3	100.0	
Missing	System	4	26.7		
Total		15	100.0		

q6.a Geometric Dimensioning & Tolerancing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral/Not familiar with	2	13.3	13.3	13.3
	Somewhat Important	5	33.3	33.3	46.7
	Very Important	8	53.3	53.3	100.0
	Total	15	100.0	100.0	

q6.b Basic Material Science

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral/Not familiar with	1	6.7	6.7	6.7
	Somewhat Important	7	46.7	46.7	53.3
	Very Important	7	46.7	46.7	100.0
	Total	15	100.0	100.0	

q6.c Designing with Plastics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	2	13.3	13.3	13.3

	Somewhat Unimportant	1	6.7	6.7	20.0
	Neutral/Not familiar with	4	26.7	26.7	46.7
	Somewhat Important	2	13.3	13.3	60.0
	Very Important	6	40.0	40.0	100.0
	Total	15	100.0	100.0	

q6.d Designing with Metals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Unimportant	1	6.7	6.7	6.7
	Somewhat Important	5	33.3	33.3	40.0
	Very Important	9	60.0	60.0	100.0
	Total	15	100.0	100.0	

q6.e Engineering Statics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	6	40.0	40.0	40.0
	Very Important	9	60.0	60.0	100.0
	Total	15	100.0	100.0	

q6.f Engineering Dynamics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	2	13.3	13.3	13.3
	Somewhat Unimportant	1	6.7	6.7	20.0
	Neutral/Not familiar with	3	20.0	20.0	40.0
	Somewhat Important	4	26.7	26.7	66.7
	Very Important	5	33.3	33.3	100.0
	Total	15	100.0	100.0	

q6.g Chemistry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	3	20.0	20.0	20.0
	Somewhat Unimportant	5	33.3	33.3	53.3
	Neutral/Not familiar with	2	13.3	13.3	66.7
	Somewhat Important	5	33.3	33.3	100.0
	Total	15	100.0	100.0	

q6.h Physics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Unimportant	2	13.3	13.3	13.3
	Neutral/Not familiar with	1	6.7	6.7	20.0
	Somewhat Important	8	53.3	53.3	73.3
	Very Important	4	26.7	26.7	100.0
	Total	15	100.0	100.0	

q6.i Finite Element Analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	9	60.0	60.0	60.0
	Very Important	6	40.0	40.0	100.0
	Total	15	100.0	100.0	

q6.j Design for Manufacturing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	2	13.3	13.3	13.3
	Very Important	13	86.7	86.7	100.0
	Total	15	100.0	100.0	

q6.k Machine Design

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Unimportant	1	6.7	6.7	6.7
	Neutral/Not familiar with	3	20.0	20.0	26.7
	Somewhat Important	4	26.7	26.7	53.3
	Very Important	7	46.7	46.7	100.0
	Total	15	100.0	100.0	

q6.l Thermodynamics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Unimportant	5	33.3	33.3	33.3
	Neutral/Not familiar with	3	20.0	20.0	53.3
	Somewhat Important	4	26.7	26.7	80.0
	Very Important	3	20.0	20.0	100.0
	Total	15	100.0	100.0	

q6.m Fluid Mechanics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	2	13.3	13.3	13.3
	Somewhat Unimportant	4	26.7	26.7	40.0
	Neutral/Not familiar with	1	6.7	6.7	46.7
	Somewhat Important	7	46.7	46.7	93.3
	Very Important	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q6.n Basic Electronics

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Very Unimportant	1	6.7	6.7	6.7
	Somewhat Unimportant	5	33.3	33.3	40.0
	Neutral/Not familiar with	1	6.7	6.7	46.7
	Somewhat Important	6	40.0	40.0	86.7
	Very Important	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

q6.o CAD Solid Modeling

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	15	100.0	100.0	100.0

q6.p Ergonomics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	2	13.3	13.3	13.3
	Neutral/Not familiar with	1	6.7	6.7	20.0
	Somewhat Important	10	66.7	66.7	86.7
	Very Important	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

q6.q Statistics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	1	6.7	6.7	6.7
	Somewhat Unimportant	3	20.0	20.0	26.7
	Neutral/Not familiar with	2	13.3	13.3	40.0
	Somewhat Important	6	40.0	40.0	80.0
	Very Important	3	20.0	20.0	100.0
	Total	15	100.0	100.0	

q6.r Manual Sketching

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	1	6.7	7.1	7.1
	Somewhat Unimportant	3	20.0	21.4	28.6
	Neutral/Not familiar with	2	13.3	14.3	42.9
	Somewhat Important	5	33.3	35.7	78.6
	Very Important	3	20.0	21.4	100.0
	Total	14	93.3	100.0	
Missing	System	1	6.7		
Total		15	100.0		

q6.s Industrial Psychology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	1	6.7	7.1	7.1
	Somewhat Unimportant	6	40.0	42.9	50.0
	Neutral/Not familiar with	3	20.0	21.4	71.4
	Somewhat Important	2	13.3	14.3	85.7
	Very Important	2	13.3	14.3	100.0
	Total	14	93.3	100.0	
Missing	System	1	6.7		
Total		15	100.0		

q6.t Applied Calculus

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	2	13.3	14.3	14.3
	Somewhat Unimportant	3	20.0	21.4	35.7
	Neutral/Not familiar with	2	13.3	14.3	50.0
	Somewhat Important	7	46.7	50.0	100.0
	Total	14	93.3	100.0	
Missing	System	1	6.7		
Total		15	100.0		

q7_1 Software: AUTOCAD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	12	80.0	80.0	80.0
	Selected	3	20.0	20.0	100.0
	Total	15	100.0	100.0	

q7_2 Software: PRO-E

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	8	53.3	53.3	53.3
	Selected	7	46.7	46.7	100.0
	Total	15	100.0	100.0	

q7_3 Software: CATIA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	13	86.7	86.7	86.7
	Selected	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

q7_4 Software: UNIGRAPHICS/Solid Edge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	12	80.0	80.0	80.0
	Selected	3	20.0	20.0	100.0
	Total	15	100.0	100.0	

q7_5 Software: SOLID WORKS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	8	53.3	53.3	53.3
	Selected	7	46.7	46.7	100.0
	Total	15	100.0	100.0	

q7_6 Software: Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Selected	12	80.0	80.0	80.0
	Selected	3	20.0	20.0	100.0
	Total	15	100.0	100.0	

q7.a Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		12	80.0	80.0	80.0
	Co Create One Space	1	6.7	6.7	86.7
	CoCreate/ME10	1	6.7	6.7	93.3
	NX (former UG, higher grade than solid edge), I-deas, both customer mandated, KeyCreator all else.	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q8 Overall, how important is the design project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	2	13.3	13.3	13.3
	Somewhat Important	1	6.7	6.7	20.0
	Very Important	12	80.0	80.0	100.0
	Total	15	100.0	100.0	

q9.a Proposal Preparation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	1	6.7	6.7	6.7
	Somewhat Important	3	20.0	20.0	26.7
	Very Important	11	73.3	73.3	100.0
	Total	15	100.0	100.0	

q9.b Estimating and Budgeting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somwhat Unimportant	3	20.0	20.0	20.0
	Somewhat Important	5	33.3	33.3	53.3
	Very Important	7	46.7	46.7	100.0
	Total	15	100.0	100.0	

q9.c Written Status Reporting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somwhat Unimportant	2	13.3	13.3	13.3
	Somewhat Important	5	33.3	33.3	46.7
	Very Important	8	53.3	53.3	100.0
	Total	15	100.0	100.0	

q9.d Conducting Design Reviews

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	1	6.7	6.7	6.7
	Very Important	14	93.3	93.3	100.0
	Total	15	100.0	100.0	

q9.e Formal Written Report

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	1	6.7	6.7	6.7
	Somwhat Unimportant	2	13.3	13.3	20.0
	Somewhat Important	4	26.7	26.7	46.7
	Very Important	8	53.3	53.3	100.0
	Total	15	100.0	100.0	

q9.f Technical Presentation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	2	13.3	13.3	13.3
	Very Important	13	86.7	86.7	100.0
	Total	15	100.0	100.0	

q9.g Project Management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	3	20.0	20.0	20.0
	Very Important	12	80.0	80.0	100.0
	Total	15	100.0	100.0	

q9.h Prototype Development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	1	6.7	6.7	6.7
	Somwhat Unimportant	1	6.7	6.7	13.3
	Somewhat Important	1	6.7	6.7	20.0
	Very Important	12	80.0	80.0	100.0
	Total	15	100.0	100.0	

q10 Difficulty hiring qualified mechanical designers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	46.7	46.7	46.7
	No	2	13.3	13.3	60.0
	Don't know/Not applicable	6	40.0	40.0	100.0
	Total	15	100.0	100.0	

q11 Best estimate describing growth potential at company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Average/Steady	7	46.7	46.7	46.7
	Probably increase in staff	8	53.3	53.3	100.0
	Total	15	100.0	100.0	

q12 Familiar with the differences between Engineering & Eng Tech

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	93.3	93.3	93.3
	No	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q13 Type of degree prefer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Engineering Technology	6	40.0	40.0	40.0
	Engineering	1	6.7	6.7	46.7
	No Preference	8	53.3	53.3	100.0
	Total	15	100.0	100.0	

q14 Familiar with ABET-TAC and ABET-EAC accreditation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	26.7	26.7	26.7
	No	11	73.3	73.3	100.0
	Total	15	100.0	100.0	

q15 Additional comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		11	73.3	73.3	73.3
	I graduated from PDET in 1996 & ended up working more as an engineer than a DE so my perspective is a little different than most. I wish I would've had more statistics education right out of that prog. I also wish we were forced to work in teams more w/ assigned project & project leaders to really push the project mgmt skills. The kids always seem to hate working in groups but those interpersonal relationships we build while working in teams are crutial to being successful on any project. Even if you are not a project leader in your job, just figureing out how to manage your own time as a DE is very important when you have multiple concurrent jobs. For todays cirriculum you might consider adding a Design for Six Sigma course even if it is only half a semester & the other half statistics. Our industry is using this tool more & more each year. We at GM are all required to have at least a Black Belt, everyone from DE's to executives. Design for failure mode effects analysis & Process failure mode & effects analysis (DFMEA & PFMEA) are also being pushed harder these days. I also want to mention that GM is now taking the stance that people w/ ET degrees will no longer be eligible for higher level (but not yet mgmt/people leader) pay grades. Pay grade 8 is a people leader, there are two bands within the pay grade 7. The higher 7 pay grades & up are no longer being given to ET degree holders. GM is doing this, Ford told me the same thing back in 2000. I'm not suggesting you change anything of course just a data point for your survey.	1	6.7	6.7	80.0

	One thing with the capstone project presentations, is in my opinion there is to much emphasis in the presentions on costing the product. I would like to see more focus on the design and validation of the product. From a standpoint of cost in the presentation, it should only be a minute or two at most in the presention, as most of them are just estimates from either someone the student knows or one of the professors, which in my mind is not of high value.	1	6.7	6.7	86.7
	Please contact me with graduates as we are looking for 3 candidates immediately. Sincerely Brodie Delemeester Engineering & Inside sales Manager Incoe Brodie.Delemeester@incoe.com	1	6.7	6.7	93.3
	The work ethic of the Ferris graduates has been the key contributor to their success here. Beyond any specific knowledge, a willingness to learn and a dedication to completing timely, quality work is the most important quality when hiring.	1	6.7	6.7	100.0
	Total	15	100.0	100.0	