Heavy Equi echnology

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APRC 2004-2005

Section 1 of 3

Heavy Equipment Technology Academic Program Review 2004 - 2005

Questions for AAS and BS in Heavy Equipment Program Review Panel Fall 2004

The following questions or requests for information are the result of our discussion concerning specific statements or material within the AAS and BS in Heavy Equipment Program Review Panel document. Please type the answer in the box to the right of the box containing the word response and e-mail this document to me no later than noon on April 18th.

Why are your enrollment numbers dropping?

response

1. **Campus rumors about HEQT programs being discontinued reached career centers.**
2. **Articulation – Up to this last year it was poorly organized**
3. **Leadership instability – COT Dean's Office**

Do you have a marketing plan? Please describe what progress have you made with respect to marketing.

response

1. **Technician of the Future Days – cooperative effort with Automotive Dept. – annually we tour over 600 career center students during the fall semesters**
2. **Attended Michigan CAT Career Nights**
3. **Attended Associated Equipment Distributors Foundation (AEDF) annual meeting in San Antonio.**
4. **Attended CONEXPO in Las Vegas.**
5. **Heavy Equipment Department has hosted the State SkillsUSA – Diesel Equipment Technology for over 20 years.**
6. **Competed in the National SkillsUSA competition for over ten years.**
7. **Faculty and Administration developing program brochure and preparing new faculty members to do presentations at career centers.**

#3 & 4 – Objective: Try to get dealers and manufacturers more involved with recruiting students

Are the numbers for graduates in the Administrative Program Review just the AAS or the AAS and BS combined?

What are the actual total numbers for the last five years for students enrolled in each program and the number in the 1st or 2nd second year in the AAS program and in the 3rd or 4th of the BS program.

What is the number of graduates from each program the last 5 years including 2002-2003 and 2003-2004?

response **See next two pages**

Ferris State University
Administrative Program Review 2004
College of Technology
Heavy Equipment Technology AAS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	34		34	25		25	23		23	20		20	25		25
Freshman SCH's	544		544	391		391	349		349	300		300	392		392
Sophomore Headcount	31		31	33		33	26		26	23		23	26		26
Sophomore SCH's	477		477	506		506	419		419	341		341	401		401
Junior Headcount	12		12	13		13	10		10	13		13	7		7
Junior SCH's	163		163	167		167	147		147	204		204	109		109
Senior Headcount	2		2			0	2		2	4		4	3		3
Senior SCH's	31		31			0	27		27	46		46	33		33
TOTAL HEADCOUNT	79		79	71		71	61		61	60		60	61		61
TOTAL SCH's	1215		1215	1064		1064	942		942	891		891	935		935

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates	23		23	30		30	30		30	41		41	29		29

Source: 7th/4th Day Counts
Institutional Research and Testing
1/26/2005

Ferris State University
Administrative Program Review 2004
College of Technology

Heavy Equip Service Engineering Tech BS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Junior Headcount	11		11	15		15	10		10	5		5	4		4
Junior SCH's	176		176	230		230	154		154	66		66	67		67
Senior Headcount	17		17	23		23	24		24	17		17	11		11
Senior SCH's	258		258	339		339	344		344	265		265	180		180
TOTAL HEADCOUNT	28		28	38		38	34		34	22		22	15		15
TOTAL SCH's	434		434	569		569	498		498	331		331	247		247

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates	9		9	5		5	12		12	18		18	14		14

Source: 7th/4th Day Counts
Institutional Research and Testing
1/26/2005

What is your real capacity? The numbers appear to be different in different parts of the report. Please elaborate on the factors limiting your capacity.

response **Official numbers for the AAS & BS degree programs are as follows:**

1. **AAS – 65**
2. **BS - 30**

There are no written established guidelines for determining program numbers.

Capacity without winter entry point
AAS – 60
BS – 30
Limiting factors

1. **Workstations**
2. **Instructional Equipmemnt**
3. **Number of faculty**

The information in the labor analysis suggests that there are far more jobs available than graduates of programs to fill them. What is the source of new employees? How big a factor is on the job training of individuals without a degree?

response **Source of new employees**
The Heavy Equipment program at FSU is one of only 15 programs in the nation accredited by the Associated Equipment Distributors Foundation (ADEF). This accreditation certifies that the curriculum meets current industry standards. Because industry demands are so much higher than supply, the distributors are required to:

1. **Dealers steal employees from other dealers. Numbers of qualified technicians are declining.**
2. **Required to make do with graduates from sub-standard private schools. Example: AIS Construction hired eight graduates from Northwestern (Located in Ohio). Fired six and had to retrain the other two.**

How big a factor is on the job training of individuals without a degree? Minimum education requirements to have a successful career in today's heavy equipment industry is an AAS degree ... in ten years a BS degree. About ten years ago the industry discovered that it was near impossible to hire successful technicians from tech centers (secondary schools).

Survey quote from one of the tech center respondents describes the reason why: I think our whole industry is in trouble. Until high school counselors stop filling the high school and career center vocational auto and heavy truck mechanics programs with special needs and special ed students, the level of training will be limited.

Does the AAS degree qualify a student for certification without additional experience? Are they able to take the exam immediately? Do your graduates take the exam and if so, how do they do?

response **Does the AAS degree qualify a student for certification without additional experience? No – Our program helps to prepare the students for certification tests. In addition to passing the ASE certification tests, graduates need to document two years of on the job work experience.**

State certification is immediate – no work experience required

	Please explain the relationship of the AAS program to the BS program. Can AAS students from other programs at Ferris directly enter into the BS program? Can a transfer student directly enter the BS program? Do you have articulation agreements with Community Colleges?
response	**Please explain the relationship of the AAS program to the BS program. 2+2 configuration. AAS is designed to ladder into the HSET BS degree.** **Can AAS students from other programs at Ferris directly enter into the BS program? Yes – If they meet program entrance requirements.** **Do you have articulation agreements with Community Colleges? Yes – there is only one community college that offers an AAS degree in construction equipment repair - LCC**

What percentage of your current enrollment is international students? Transfers from other institutions? What is the nature of those institutions?

response **What percentage of your current enrollment is international students? 4% Transfers from other institutions? Minimal 2-4%**

Does Ferris currently accept credits from private trade schools? Do you have a proficiency exam?

response **Does Ferris currently accept credits from private trade schools? Cannot answer for Ferris but, the Heavy Equipment will accept credits from accredited institutions.**

Do you have a proficiency exam? We have proficiency exams for most of our AAS courses

What is the advantage of the BS degree to a student?

response **Transferable skills for a varied job market. Better prepares them for a life long career as compared to just getting a job. Knowledge and skills acquired are assets for a higher entry-level employment and upward mobility after employment.**

Please elaborate on your plans to merge maintenance and repair and manufacturing options.

response **Implementation of curriculum revisions will be completed this term - Winter 05**

Describe the curriculum changes have you made and what do you hope to accomplish by them?

response **AAS degree**

1. **Offer internship in place of service floor**
    a. **Students have more one-on-one supervision**
    b. **Students work on up-to-date equipment**
    c. **Students have more time on the job**
    d. **Increased quality of education**
    e. **Reduced faculty overloads**
    f. **Increased faculty productivity**
    g. **Increased revenue for the university – Tuition Dollars**

BS degree

1. **Merge maintenance and repair and manufacturing options**
    a. **Students have a wider range of courses to select from**
    b. **Students are exposed to more up-to-date and advanced technology**

The survey data suggests that 23% of the respondents are unemployed. Do you have any insights as to why that may be the case in view of the labor statistics?

response **A good accounting of this information was unobtainable. Several questionnaires were received marked yes, as being unemployed, when other responses on the instrument indicated they were currently employed or retired. Also on a few of the questionnaires, a yes was initially marked and then changed to no. Obviously, this question on the survey instrument was confusing and the data should be regarded as inaccurate.**

Who is currently teaching in your program and what courses are they teaching?

response

1. **Keith Cripe: Transport Refrigeration**
2. **Gary Maike: Planned Maintenance, Fleet Management, Planned Maintenance Systems, HEQ Electrical Systems, Troubleshooting Strategies**
3. **John Strohkirch: Maintenance Fundamentals, Fluid Power Fundamentals, HEQT Engine Technology, Applied Failure Analysis,**
4. **Darren Wilson: Troubleshooting Strategies, Diesel Fuel Systems Technology, HEQ Power Transfer, HEQ Automatic Transmission**
5. **Jerry Zmyslowski: HEQ Electronic Fundamentals, HEQ Advanced Hydraulics, Interactive Electronic Controls, Testing System & Analysis**
6. **Doug Ginnever (Adjunct): A. C. Power Generation, Generator Controls & Switch Gear Systems**

Please describe the Electrical Power Generation Technology Certificate Program. What is its current status? What is its impact on faculty load?

response **What is its current status? Enrollment increasing**

What is its impact on faculty load? None – Currently taught through UCEL – adjunct faculty

What is the AIS Komatsu Certificate Program? What is its current status? What is its impact on faculty load?

response **No longer offered**

Please discuss the fall and winter entry point for the program. Is that option still available? What impact does that have on faculty load?

response

Please discuss the fall and winter entry point for the program. Is that option still available? No - Administrative decision to eliminate winter entry point – not supported by the Heavy Equipment Department any other non-administrative organization.

What impact does that have on faculty load? Reduces overloads

Describe the internships for your students and how are they administered. Do BS students do a second internship?

response **Both the AAS and BS degree programs have required summer internships. Internship policies and agreements attached**

Please explain the need for additional S & E. Why did the program S&E cost increase even though you had a decline in enrollment?

response **Revenue was generated on the service floor by repairing outside customer equipment. This revenue from lab Practice (Service Floor) was lost when AAS curriculum revisions were implemented. Service floor maintained and repaired all equipment used in the other labs. Income from the service floor accounts paid for all outside service contracts. Waste oil, Safety-Clean, & machining costs**

In the Administrative Program Review mention is made of Clinic revenue. Please explain what his is and why no revenue is listed for FY03.

response **No service floor – see above statement – Additional S&E**
In addition to the lost service floor revenue we had additional cost associated with the internship program.

How many full time faculty are there currently in your program? How many faculty retirements do you anticipate and how soon?

response **How many full time faculty are there currently in your program? 5**

How many faculty retirements do you anticipate and how soon? Don't know

Elaborate on part 2 of the conclusion with respect to administrative effectiveness.

response **It is well known that the leadership in the COT has fluctuated over an exceptional number of years. For over the last eight years, the Heavy Equipment Department has not been allowed to have input into any of the major decisions directly affecting our programs. Decisions to solve the perceived problems were, and still are, based on rumors not actual facts. Furthermore, these perceived problems were never identified or substantiated by upper-level management.**

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Section 01. Program Overview

a) Preface
b) Program history and information
c) Administrative Program Review
d) Nature of the program and its value to the University, Michigan and the United States
e) Benefits the program provides to students
f) Mission statement – Goals of the program

a) Preface

During the past years the heavy equipment industry has been in transition from traditional mechanical systems with mechanical controls to interfacing systems with very sophisticated computerized electronic controls. This transition is requiring heavy equipment instructional programs to include more technical content in its courses, at a higher level, in order to prepare graduates with the necessary knowledge and skills to meet job requirements. Consequently, heavy equipment program administrators and faculty have been forced to closely analyze existing curriculums to find ways of including additional technical instruction.

As a result of data obtained from industry and alumni surveys, it has been concluded that the solution was to implement a "two plus two" program at Ferris State University. An A.A.S. degree in Heavy Equipment Technology (HET) program serves industry with highly skilled technicians. A BS degree in Heavy Equipment Service Engineering Technology serves the industry with technically oriented managers, specialists, and engineering technicians.

This academic program review is a study of the 2-year A.A.S. HET (HEQT) program and the 4-year BS Heavy Equipment Service Engineering Technology (HSET) program.

The HEQT and the HSET degrees are unique to the heavy equipment industry, Michigan and the United States. The HEQT program was implemented in 1959 as a certificate program and has evolved into one of the top rated programs in the United States. Up to two years ago, the HEQT program was the *only one* of twelve such programs in Michigan and up to five years ago Ferris State University was the only public university that offered a program of this type in the Midwest. The HSET program is the *only* technical BS degree program in the United States.

The HEQT and the HSET degree programs have had a very positive affect on the heavy equipment industry. For years the industry has benefited from the quality of our graduates. Ferris' HET programs is recognized as a leader with our graduates from the HEQT and HSET programs working in all areas throughout Michigan, the United States and around the world.

Students from Botswana, South Africa, Malaysia, India, the Caribbean Islands, Ethiopia, Morocco and Angola have taken advantage of the HEQT and the HSET programs. The government of Botswana has made the HEQT and the HSET programs their number one choice for their heavy equipment students.

b) Program History

The HET curriculum was first offered in 1959 under the umbrella of what is now the Automotive Department. Most of the courses were taught off campus. By 1968 the program had outgrown its off-campus facilities and was moved on campus. Given the

success of the program, an application for state funds to build a permanent on campus facility for the program was initiated in 1970. Expansion of the Auto Body program required the Heavy Equipment to move to another off campus location, an old furniture factory located on Madison Street. Although the move was intended to be temporary, a maximum of three years, because Michigan's economy took a nosedive in the 1970's, the funding for a new facility was delayed for thirteen years. In 1983 state funding for the new facility was approved. While the new building was being constructed, the Heavy Equipment program was moved on campus to what is now the General Services building. In 1987 the HET department was moved into its permanent facility, located at 220 Sports Drive.

As the Heavy Equipment program evolved, it became evident that even through the Automotive and Heavy Equipment classes used the same names, the course content for each discipline was not. Entry level technical knowledge and skills for graduates entering the heavy equipment workforce were, and still are, totally different from the automotive workforce. Recognizing the difference between the two distinctly different industries, it was evident a name change was required to identify each educational area. Therefore, the two programs were split into separate entities – the Automotive Technology Department and the Heavy Equipment Technology Department. At the same time administrative assignments were reviewed and each department named its own department head.

In 1996 the Automotive and HET departments were merged with the Transportation and Electronics department. Program coordinators were selected by faculty members to represent the programs. In 2000 a restructure took place and the College of Technology was divided into twelve distinct departments with elected department chairs representing their respective departments. HET was one of the recognized departments.

c) Program Information

- Students in the HET programs receive technical education and training to prepare them for jobs in a variety of fields such as agriculture, construction, forestry, mining, on & off road trucking, materials handling, stand-by power generation, compacting equipment, marine equipment and industrial power.

- The HET programs are recognized nationally and internationally as a leader in the preparation of entry-level equipment service technicians. The HET program has had students from throughout the United States, Canada, as well as, Africa, the Middle East, Malaysia and South America.

- For years our students have been recognized as major contenders the state and national SkillsUSA-VICA, Diesel Engine Technology competition. For six out of the last nine years, our students have placed in the top four. Three of the six years, Ferris students have captured first place. The students compete against an average of thirty-five competitors from across the United States, many of whom are professional heavy equipment service technicians. For over twenty-five years, the

HET department has hosted the Michigan SkillsUSA-VICA competition for diesel engine equipment technology.

- The HET programs were recognized as a Center of Excellence by Caterpillar in 1992. A cash award of $25,000 was presented by the Caterpillar Foundation and an additional $25,000 was presented by MichiganCAT. The grant was renewed in 1993 and 1994.

- The North Central Association of Colleges and Schools accredit the HET program. The HEQT program is ASE Master Certified for Medium and Heavy Duty Truck through the National Automotive Technicians Education Foundation (NATEF).

- The HEQT program was the first program in the United States to be accredited by the Associated Equipment Distributors Foundation (AED). AED is the only organization recognized by the heavy equipment industry to accredit post-secondary heavy equipment programs.

- The HEQT and HSET curriculums are reviewed and revised annually to include new and evolving technology.

- The Heavy Equipment Technology faculty have years of successful field experience. In addition to being professionally prepared teachers, the faculty participates in professional development activities to maintain their skills and their knowledge. Many of these development activities are sponsored by the heavy equipment industry.

- The HET programs emphasize skills development, as well as, fundamental knowledge development in technical theory, mathematics, physical & behavioral sciences and oral and written communications.
- The HET programs at Ferris State University is one of the, if not the, best heavy equipment program in the United States. Our two-year A.A.S degree program ladders to the four-year BS degree program. Other BS degree options available to the A.A.S. degree graduates include: Teacher Education, Business, Computer Science, Automotive Engineering Technology and Automotive & Heavy Equipment Management.
- A certificate in Electrical Power Generation is available to the two- and four-year students.

d) Administrative Program Review – 2003

Program/Department: _Heavy Equipment_____

Purposes of Administrative Program Review:

to make deans and department heads/chairs aware of important quantitative and qualitative information about the programs in their colleges

to make the Vice President for Academic Affairs' Office aware of important quantitative and qualitative programmatic information from across the University

to document annual information that will be useful in the University's accreditation efforts

to provide information for the Academic Program Review Council to use in its deliberations

Please provide the following information:

Enrollment

	Fall 1999	Fall 2000	Fall 2001	Fall 2002	Fall 2003
Tenure Track FTE	7	7	7	7	5.2
Overload/Supplemental FTEF	2	2	2	1	1/2
Adjunct/Clinical FTEF (unpaid)					
Enrollment on-campus total*	93	107	109	95	82
Freshman	28	34	25	23	20
Sophomore	25	31	33	26	23
Junior	25	23	28	20	18
Senior	15	19	23	26	21
Masters					
Doctoral					
Pre-Tech Students	15	23	18	11	11
Enrollment off-campus*					
Traverse City					
Grand Rapids					
Southwest					
Southeast					

*Use official count (7-day)

If there has been a change in enrollment, explain why:
If there has been a change in enrollment, explain why: Department secretary relocated on campus during a critical recruitment period. Our department went without a secretary from January into March

Capacity:

Estimate program capacity considering current number of faculty, laboratory capacity, current equipment, and current levels of S&E.

AAS/HEQT 65 students

BS/HSET 30 students

What factors limit program capacity? 1. Lab Space & Equipment
2. Number of Faculty
3. S&E Budget

Financial

Expenditures*	FY 99	FY 00	FY 01	FY 02	FY 03
Supply & Expense	27,192	28,000	28,000	28,000	28,087
Faculty Prof. Development					1,200
General Fund					
Non-General Fund					
UCEL Incentives					
FSU-GR Incentives					
Equipment					
Voc. Ed. Funds	25,000	10,000	19,421	24,000	27,008
General Fund					
Non-General Fund					
UCEL Incentives					
FSU-GR Incentives					

*Use end of fiscal year expenditures.

If you spent UCEL and FSU-GR incentive money for initiatives/items other than faculty professional development and equipment, what were they? Explain briefly. Please also include amounts spent on each initiative/item.

Revenues	FY 99	FY 00	FY 01	FY 02	FY 03
Net Clinic Revenue	3,000	4,000	3,000	5,000	
Scholarship Donations	650.00	1,352		3,000	3,000
Gifts, Grants, & Cash Donations		1,400		350	1,000
Endowment Earnings	1,000	3,000	2,500	2,000	2,000
Institute Programs/Services		57,482	3,000	5,000	3,500
In-Kind	3,000	4,000	3,000	50,000	38,400

Other

	AY 98-99	AY 99-00	AY 00-01	AY 01-02	AY 02-03
Number of Graduates* - Total	46	31	35	43	NA
- On campus					
- Off campus					
Placement of Graduates	90%	100%	100%	100%	100%
Average Starting Salary	24,000	28,000	31,000	32,000	33,500
Productivity - Academic Year Average	255.65	268.93	297.70	271.63	273.52
- Summer			96.24	115.86	143.28
Summer Enrollment				31	38
* Use total for full year (S, F, W) Productivity HSET			234.00	378.27	370.73

1. a) Areas of Strength:

One of few programs in nation – only one left in Michigan

Programs nationally and internationally recognized

High demand for students

4. Range of technical skills and competence of graduates

b) Areas of Concern and Proposed Actions to Address Them:

Increase student enrollment - Develop marketing plan

Increase revenues – Maximize the potential of the Transportation Institute

Increase S&E funding – University needs to change its funding priorities

Leadership and support by the upper administration - ?

Having to teach with outdated equipment and instructional units – Work with the University and the COT to develop a data base of equipment/instructional units that need replacing along with developing a system for funding the needed equipment/instructional units.

2. Future goals (please give time frame):

Work with the Associated Equipment Distributors Foundation (AED) to achieve national recognition as an accrediting organization for secondary and post-secondary heavy equipment programs.

Increase technical training offerings through the Transportation Institute focusing on Electrical Power Generation.

3. Other Recommendations:

Increase department/program funding by the university … we have made program changes that benefit the university but have increased our operational costs. If the university wants departments/programs to increase operational efficiencies while maintaining or improving the quality of education, the university has a responsibility to insure that there is a plan to cover the additional operational costs. The recent Heavy Equipment Department curriculum changes saved the university approximately $10,000 in annual overload pay while increasing tuition dollar earnings approximately $20,000. Program S&E cost increased about $10,000 - $13,000. As of this date the University has not responded to our requests for additional funding. We made the changes because they were educationally sound decisions. The University looks at changes solely from an economical point of view.

4. Does the program have an advisory committee? Yes

If yes, when did it last meet? November 13, 2003

If no, why not? By what other means does the faculty receive advice from employers and outside professionals?

When were new members last appointed? We have about 23 members to choose from … we choose between 6 – 10 members from the list each time we have a meeting

What is the composition of the committee (how many alumni, workplace representatives, academic representatives)? 30%-50% alumni & workplace representatives, 50% faculty

Please attach the advisory committee charge, if there is one.

5. Does the program have an internship or other cooperative or experiential learning course? Yes

If yes, is the internship required or recommended? Required

a) If no, what is the reason for not requiring such an experience?

b) How many internships take place per year? Approx 35 What percentage of majors has internships? 100%

6. Does the program offer courses through the web? No

a) Please list the web-based courses (those delivered primarily through the internet) the program offered last year?

b) Please list the web-assisted courses the program offered last year.

7. What is unique about this program?
Only one of its kind in Michigan … 4-year program is the only one of its kind in the nation. We have national and international recognition. One of a limited number of Universities that offer a certificate program in Electrical Power Generation.

a) For what distinctive characteristics is it known in the state or nation? Curriculum – We are one of the largest heavy equipment programs in North America. For

over the last 15 years the heavy equipment program has been represented at the SkillsUSA – VICA national competition and in the past 9 years we have won 3 first place, 1 second, 1 third, and 1 fourth. The Heavy Equipment Technology program is certified by the National Automotive Technicians Education Foundation (NATEF) and accredited by the Associated Equipment Distributors (AED).

b) What are some strategies that could lead to (greater) recognition?

1. Working with AED to achieve accreditation for our two-year program and have Michigan recognize AED as an accredit ting organization.
2. Advertise and market the Electrical Power Generation program.

8. Is the program accredited? By whom? If not, why? When is the next review?
The Heavy Equipment Technology program is certified by the National Automotive Technicians Education Foundation (NATEF) and accredited by the Associated Equipment Distributors (AED).

Next review - 2005

9. What have been some major achievements by students and/or graduates of the program? By faculty in the program?

1. For over the last 15 years the heavy equipment program has been represented at the SkillsUSA – VICA national competition and in the past 9 years we have won 3 first place, 1 second, 1 third, & 1 fourth.
2. Hydraulics instructor (Jerry Zmyslowski) has had input and helped design hydraulic systems that are currently being used in the heavy equipment industry.
3. All HET faculty have presented technical workshops throughout Michigan to industry managers, employees, and technicians.

10. Questions about Program Outcomes Assessment/Assessment of Student Learning at the Program Level
(Attach additional sheets, if necessary.)

a) What are the program's learning outcomes?
According to the University student learning outcomes are the key abilities that students will be able to demonstrate after program completion.
The goals of both of our programs are for the students to troubleshoot, diagnose, and repair systems and components of equipment used in the heavy equipment industries. The heavy equipment industry consists of construction, agricultural, forestry, marine, mining, transport refrigeration, and electrical power generation. Our graduates have the opportunity to be qualified for employment and advancement in 11 subject areas within these 7 fields. Program Outcomes

Assessment questions could best be answered by the Heavy Equipment Technology and Heavy Equipment Service Engineering Technology graduates.

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

Since our program is so unique and our students are trained to assume rolls that require a wide range of skills, we don't know how we could accomplish a program Outcomes Assessment of our program or how beneficial or useful the information would be to our program.

Assessment Measures:

- Recognition from industry - The Heavy Equipment Technology program is recognized by the heavy equipment industry as the number one program in the nation.

- National and international recognition - Our program has national and international recognition.

- Program accreditation - Our program has earned every possible accreditation that relates to the heavy equipment industry. Our two-year program is certified through the National Automotive Technicians Education Foundation (NATEF). It is also the first heavy equipment program in the nation to be accredited through the Associated Equipment Distributors.

- National Competitions – Students enrolled in our two-year program have won first place in three out of the last eight years of national competition. (Skills USA-VICA, Diesel Equipment Technology)

- Student employment – Both our two and four-year programs have 100% placement of their graduates. Feedback indicates that our students are the first to be considered for employment and the last to be let go when there is a downturn in the economy.

- Unique programs – We have a one-of-a-kind, in the nation, BS degree program. We also offer two additional certificate programs: Komatsu repair and Electrical Power Generation

c) What are the standards for assessment results?
   1. Program accreditation/s
   2. Success at national competition
   3. Percentage of students employed

d) What were the assessment results for 2001-02?
   1. Achieved accreditation – Associated Equipment Distributors (AED)
   2. Out of the last 9 years of competing nationally
      a. 3- first place

b. 1 – second
c. 1 – third
d. 1 – fourth

3. 100% employment of our students

e) How will / how have the results been used for pedagogical or curricular change? Curriculum changes and course outline modification.

11. Questions about Course Outcomes Assessment:

a) Do all multi-sectioned courses have common outcomes? Yes

b) If not, how do you plan to address discrepancies?

c) Do you keep all course syllabi on file in a central location? Yes

*If you have questions about the outcomes assessment portions of this survey, please contact Laurie Chesley (x2713).

Form Completed by____Keith Cripe, Department Chair, December 16, 2003_____
Name and Title / Date

Reviewed by Dean_____
Name / Date

Comments by Dean:

e) Nature of the Program – Its Value to the University, State and Nation

The HEQT and the HSET programs are unique to the heavy equipment industry in Michigan and the United States. The current HEQT program was implemented in 1959 as a certificate program and has evolved to one of the top rated programs in the country because of industry needs. Until two years ago, the HEQT program was the only one of twelve heavy equipment programs left in Michigan, today there are only two. Five years ago Ferris was the ***only*** public university to offer a two-year A.A.S. degree program in the Midwest, today there are five. These five schools support the entire heavy equipment industry. The HSET program is the ***only*** technical degree program of its kind in the United States.

The HEQT and the HSET programs have had a very positive impact on the heavy equipment industry. For years, the industry has benefited from the quality of our graduates. Ferris' HET program is recognized as an industry leader. Our graduates not only work in Michigan but throughout the United States and Canada but in Botswana, South Africa, Malaysia, India, the Caribbean Islands, Ethiopia, Morocco and Angola. The government of Botswana has made both the HEQT and the HSET programs, their number one choice for their heavy equipment students.

f) Benefits the Program Provides to the Students

- 100% job placement with excellent benefits for both degree programs
- Ability to advance into upper level management positions
- Transferable skills in a varied job market

g) Mission Statement

Educate technically skilled leaders for the heavy equipment industry.

h) Goals and Objectives

Goal 1: Merge the Maintenance & Repair Option and the Manufacturing Option of the HSET program.

Objectives:

1. Review and revise curriculum course offerings.
2. Review and revise course outlines.
3. Acquire updated lab equipment, machinery and tools for the lecture/lab courses.
4. Update program curriculum as necessary to include the new technology, lab equipment, machinery and tools to stay current with the needs of the heavy equipment industry.
5. Advisory committees members will advise the program on new and evolving technology as it becomes available and how it could be integrated into the program.

Goal 2: Assist AED to become accredited through the Council for Higher Education Accreditation (CHEA) Organization.

Objectives:

1. Apply for funding through the Academic Affairs Office to attend out-of-state meetings.
2. Assist AED to fulfill all requirements for the accreditation process.

Goal 3: Develop and implement ideas that would market and "showcase" the HET programs and the heavy equipment industry.

Objectives:

1. Develop training modules along with a flexible delivery system to train and update practicing technicians by maximizing the potential of the Transportation Institute. This is presently being done through Ferris' Corporate and Professional Development Center.
2. Develop educational modules along with a flexible delivery system to certify and train educators. These modules could be offered through Ferris' University Center for Extended Learning (UCEL).
3. Assist AED to become nationally recognized.
4. Advertise and market the Electrical Power Generation Certificate program.
5. Increase articulation agreements out-of-state technical colleges along with in-state career centers and high schools.
6. Increase program awareness and industry needs to high school and career center counselors throughout Michigan via Heavy Equipment Technology Day.
7. Continue to update the HET web page.
8. Continue to host the Michigan SkillsUSA-VICA, Diesel Equipment Technology competition.
9. Support any HET students who qualify for the SkillsUSA-VICA Diesel Equipment Technology national competition.

Goal 4: To investigate and identify new and future technology within each industry served by the HET programs and to develop a plan for the systematic replacement of old and obsolete lab equipment, machinery and tools.

Objectives:

1. Acquire updated lab equipment, machinery and tools for the lecture/lab courses.
2. Update program curriculum as necessary to include the new technology, lab equipment, machinery and tools.
3. Advisory committees members will advise the program on new and

evolving technology as it becomes available and how it could be integrated into the program.

4. Advisory committees and industry will be used as a re source for procuring new lab equipment, machinery and tools.

Goal 5: To investigate and identify new and future technology within each industry served by the HET program and to develop a plan to provide training for the faculty to upgrade their skills and knowledge in the areas of their specific responsibilities.

Objectives:

1. Provide funding for the faculty to upgrade their skills and knowledge.
2. Advisory committees will advise the department on the availability of training on new and evolving technology.
3. Update program curriculums as necessary to include the new technology, lab equipment, machinery and tools to stay current with the needs of the heavy equipment industry.
4. To recognize Ferris as the "national center" for education and training for the heavy equipment industry.
5. In cooperation with the Corporate and Professional Development Office and UCEL, develop a plan for the training and education of practicing technicians.

Goal 7: Acquire additional sources of income for the HET department.

Objectives:

1. Maximize the potential of the Transportation Institute. This organization provides technical workshops for practicing technicians throughout Michigan.

Section 02. Graduate follow-up survey

a) Population

b) Survey results

a) Population

- 1300 surveys sent
- 195 surveys returned
- 20 returned because of bad addresses
- 6 surveys returned late and not counted
- 179 valid surveys
- Responses received from graduates were from every from 1960 – 2003 with the exception of 1961, 1992 and 1995

b) Survey Results

- 65% of the graduates are working in one of the following industries:
  - Trucking – 32.2%
  - Construction – 24.6%
  - Agricultural – 7.8%
  - Forestry - .2%
- Education received at Ferris State University
  - 87.7% felt their education in heavy equipment technology adequately prepared them for their first job.
  - 35% of the graduates continued their education beyond the associates degree.
- HET Programs – Course Content concerns have been addressed in our curriculum revisions.

Ferris State University
Heavy Equipment Technology Alumni Survey

General Directions: Please complete **ALL** responses that apply by filling in the corresponding answer on the answer sheet. For the category "OTHER_____" or comments at the end of the survey, please record your answers directly on the survey form. Your frank response is very important for the improvement and continued success of the Heavy Equipment Program.

Section 1 – General Information

1. What year did you graduate from the Heavy Equipment Program?
   19_____ 20____

2. What degree did you receive from Ferris? **(SELECT ONE)**
   - ☐ 1-Associates
   - ☐ 2-Bachelors
   - ☐ 3-Both

3. How many different employers have you had since graduation?
   - ☐ 1-One
   - ☐ 2-Two
   - ☐ 3-Three
   - ☐ 4-Four
   - ☐ 5-Five or more

4. Are you presently unemployed? (If you answer yes, complete the survey as if you were still employed by your last employer.)
   - ☐ 1-Yes
   - ☐ 2-No

5. What is your present job title or classification? **(SELECT ONE)**
   - ☐ 1-Technician
   - ☐ 2-Foreman/Manager
   - ☐ 3-Service Representative
   - ☐ 4-Management/Owner
   - ☐ 5-Other_____

6. What is the nature of your present employer's or your business? **(SELECT ONE)**
   - ☐ 1-Dealership/Distributor
   - ☐ 2-Manufacturer
   - ☐ 3-Educational Institution
   - ☐ 4-Speciality Shop (e.g. injection pump rebuild or electrical component rebuild)
   - ☐ 5-Other_____

7. What type of industry does your present employer or your business serve?
(SELECT THE ONE WHERE YOU DO THE MOST BUSINESS VOLUME.)

- ☐ 1-Agriculture
- ☐ 2-Automotive
- ☐ 3-Construction
- ☐ 4-Forestry
- ☐ 5-Generator sets (stand-by power)

(Go to Question 8 for more choices.)

8. Continuation of Question 7.

- ☐ 1-Marine
- ☐ 2-Refrigeration
- ☐ 3-Trucking
- ☐ 4-Other_____

9. If teaching is your primary job, please SELECT the type of institution for which you teach. If teaching is **NOT** your primary job, skip to Question 10. **(SELECT ONE)**

- ☐ 1-High School
- ☐ 2-Career Center
- ☐ 3-Community/Junior College
- ☐ 4-Four year College/University
- ☐ 5-Manufacturer/Distributor/Dealership

SECTION 2 – FIRST JOB INFORMATION

10. On your first job, how many months did you work before attending some type of additional schooling? **(SELECT ONE)**

- ☐ 1-One to six months
- ☐ 2-Seven to twelve months
- ☐ 3-Thriteen to eighteen months
- ☐ 4-Ninetee to twenty four months
- ☐ 5-More than twenty four months

11. What was the nature or your first employer's business after graduation? **(SELECT ONE)**

- ☐ 1-Dealership/Distributor
- ☐ 2-Manufacturer
- ☐ 3-Educational Institution
- ☐ 4-Speciality Shop (e.g. injection pump rebuild or electrical component rebuild)
- ☐ 5-Other_____

12. What type of industry did your business or your first employer after graduation serve? **(SELECT ONE)**

- ☐ 1-Agriculture
- ☐ 2-Automotive
- ☐ 3-Construction
- ☐ 4-Forestry
- ☐ 5-Generator sets (stand-by power)

(Go to Question 13 for more choices.)

13. Continuation of Question 12.

- ☐ 1-Marine
- ☐ 2-Refrigeration
- ☐ 3-Trucking
- ☐ 4-Other_____

14. On your first job, did you serve a specific amount of time as a trainee?

- ☐ 1-Yes
- ☐ 2-No

15. If you answered **YES** to Question 14, how many months did you serve as a trainee? **(SELECT ONE)**

- ☐ 1- Less than one month
- ☐ 2-One to six months
- ☐ 3-Seven to twelve months
- ☐ 4-More than twelve months
- ☐ 5-More than twenty four months

16. Did your education at Ferris adequately prepare you for your first job?

- ☐ 1-Yes
- ☐ 2-No

17. If you answered **NO** to Question 16, in what area(s) was your education lacking?

SECTION 3 – EDUCATION

18. Have you received any degrees in addition to your Heavy Equipment Service degree?

- ☐ 1-Yes
- ☐ 2-No

19. If yes, please SELECT those boxes that apply?

- ☐ 1-Automotive
- ☐ 2-Automotive Heavy Equipment (AHEM)
- ☐ 3-Trade Technical Teaching
- ☐ 4- Business
- ☐ 5-Engineering

20. Please list below ALL factory schools that you attended during your first two years of employment after graduation. Please provide the Subject or Course Name.

_____

_____

_____

_____

SECTION 4 – TASK INVENTORY

Listed below are several tasks that may be encountered in the Heavy Equipment field. If you're presently working in the Heavy Equipment industry, please rate each task by marking the same number on the answer sheet that indicates how often you encounter it on your **PRESENT** job, otherwise skip to Question #59.

	Very Often	Some-Time	Seldom	Never
21. Air brakes troubleshooting	4	3	2	1
22. Hydraulic brakes troubleshooting	4	3	2	1
23. Rebuild of major brake components	4	3	2	1
24. Turn brake drums or rotors	4	3	2	1
25. Air conditioning system troubleshooting	4	3	2	1
26. Air conditioning component rebuilding	4	3	2	1
27. Diesel engine overhaul	4	3	2	1
28. Gasoline engine overhaul	4	3	2	1
29. LP gas engine overhaul	4	3	2	1
30. Differential cone point setting	4	3	2	1
31. Rebuild planetary sets or hubs	4	3	2	1
32. Carburetion system troubleshooting	4	3	2	1
33. Carburetor overhaul	4	3	2	1
34. Diesel injection system troubleshooting	4	3	2	1
35. Diesel injector cleaning and setting	4	3	2	1
36. Diesel injection pump overhaul	4	3	2	1
37. Diesel injection pump calibration	4	3	2	1
38. Electronic fuel injection systems servicing	4	3	2	1
39. Electrical lighting system troubleshooting	4	3	2	1
40. Electrical troubleshooting starting & charging systems	4	3	2	1
41. Electrical troubleshooting ignition systems	4	3	2	1
42. Electrical troubleshooting computer control systems	4	3	2	1
43. Generator or alternator rebuilding	4	3	2	1
44. Starter rebuilding	4	3	2	1
45. Electronic ignition systems	4	3	2	1

46. Ignition system scope analysis	4	3	2	1
47. Hydraulics troubleshooting	4	3	2	1
48. Hydraulics component rebuilding	4	3	2	1
49. Manual transmission rebuilding	4	3	2	1
50. Automatic/powershift trans. troubleshooting	4	3	2	1
51. Automatic/powershift trans rebuilding	4	3	2	1
52. Hydrostatic transmission troubleshooting	4	3	2	1
53. Suspension system alignment	4	3	2	1
54. Suspension system alignment	4	3	2	1
55. Suspension system rebuilding	4	3	2	1
56. Front axle rebuilding	4	3	2	1
57. Pin and bush track systems	4	3	2	1

58. If Ferris could provide courses for updating your skills and knowledge, would you be interested in taking these courses?

☐ 1-Yes
☐ 2-No

59. Please provide the city and state in which you work.

City_____

State_____

Zip_____

60. Additional comments and/or suggestions:

Please place the answer sheet and the survey in the enclosed pre-addressed envelope.

Thank you very much for your help in making the Heavy Equipment Program a continued success!

HEQT Alumni Survey...2004 Fall

Frequencies

Prepared by: Institutional Research & Testing, 11/04

Statistics

	N				
	Valid	Missing	Mean	Median	Std. Deviation
q2 Degree	179	2	1.68	1.00	.903
q3 No. employers since graduation	180	1	2.98	3.00	1.426
q4 Presently unemployed	180	1	1.77	2.00	.424
q5 Present job title/classification	176	5	2.85	3.00	1.704
q6 Nature of employer's business	175	6	3.05	2.00	1.795
q7 Industry employer serves	98	83	2.45	3.00	.863
q8 Industry employer serves (cont'd)	104	77	3.37	3.00	.608
q9 Type of institution where teach	16	165	2.94	2.00	1.482
q10 Mos. work before did more school	164	17	2.51	2.00	1.599
q11 Nature of 1st employer's business	173	8	2.60	2.00	1.810
q12 Industry 1st employer served	102	79	2.37	2.50	.783
q13 Industry 1st employer served (cont'd)	97	84	3.12	3.00	.600
q14 Serve specif time as trainee (1st job)	177	4	1.67	2.00	.473
q15 How many mos serve as trainee	60	121	2.42	2.00	1.062
q16 FSU education prepare you	179	2	1.12	1.00	.329
q18 Any degrees besides Hvy Equip Svc	176	5	1.64	2.00	.481
q19a If yes: Automotive	61	120	.16	.00	.373
q19b If yes: Automotive Heavy Equip (AHEM)	61	120	.39	.00	.493
q19c If yes: Trade Technical Teaching	61	120	.26	.00	.444
q19d If yes: Business	61	120	.20	.00	.401
q19e If yes: Engineering	61	120	.07	.00	.250
q21 Air brakes troubleshoot'g	119	62	2.79	3.00	1.127
q22 Hydraulic brakes troubleshoot'g	119	62	2.54	3.00	.972
q23 Rebuild of major brake components	118	63	2.60	3.00	1.079
q24 Turn brake drums or rotors	119	62	1.49	1.00	.955
q25 Air condition'g system troubleshoot'g	116	65	2.78	3.00	1.193
q26 Air condition'g component rebuild'g	116	65	1.52	1.00	.899
q27 Diesel engine overhaul	118	63	2.64	3.00	1.106
q28 Gasoline engine overhaul	118	63	1.92	2.00	.983
q29 LP gas engine overhaul	116	65	1.30	1.00	.701
q30 Differential cone point setting	116	65	1.77	1.00	.945
q31 Rebuild planetary sets or hubs	118	63	2.03	2.00	1.093
q32 Carburetion system troubleshoot'g	117	64	1.96	2.00	.913
q33 Carburetor overhaul	117	64	1.78	1.00	.992
q34 Diesel injection system troubleshoot'g	118	63	3.09	3.00	.970
q35 Diesel injection cleaning & setting	117	64	2.22	2.00	1.107
q36 Diesel injection pump overhaul	117	64	1.52	1.00	.943
q37 Diesel injection pump calibration	117	64	1.51	1.00	.934
q38 Electronic fuel injection systems svc'g	117	64	2.49	3.00	1.157
q39 Electrical light'g system troubleshoot'g	116	65	3.34	4.00	.997
q40 Electrical troubleshoot'g start'g & charg'g syst's	118	63	3.38	4.00	.960
q41 Electrical troubleshoot'g ignition systems	118	63	2.62	3.00	1.070
q42 Electrical troubleshoot'g computer ctrl syst's	117	64	2.91	3.00	1.063

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing			
q43 Generator or alternator rebuild'g	116	65	1.48	1.00	.899
q44 Starter rebuild'g	116	65	1.47	1.00	.879
q45 Electronic ignition systems	117	64	2.10	2.00	.959
q46 Ignition system scope analysis	115	66	1.26	1.00	.702
q47 Hydraulics troubleshoot'g	117	64	2.96	3.00	1.102
q48 Hydraulics component rebuild'g	116	65	2.52	3.00	1.219
q49 Manual transmission rebuild'g	117	64	1.97	2.00	1.025
q50 Automatic/pwrshift trans. troubleshoot'g	117	64	2.42	2.00	1.108
q51 Automatic/pwrshift trans. rebuild'g	117	64	1.86	1.00	1.066
q52 Hydrostatic transmission troubleshoot'g	116	65	2.08	2.00	1.120
q53 Suspension system alignment	116	65	1.88	2.00	1.014
q54 Suspension system alignment	110	71	1.84	1.50	.991
q55 Suspension system rebuild'g	116	65	2.23	2.00	1.050
q56 Front axle rebuild'g	115	66	2.17	2.00	1.008
q57 Pin & bush track systems	115	66	1.71	1.00	1.058
q58 Take FSU courses to update skills	120	61	1.46	1.00	.500

Frequency Table

q2 Degree

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Associates	111	61.3	62.0	62.0
	Bachelors	15	8.3	8.4	70.4
	Both	53	29.3	29.6	100.0
	Total	179	98.9	100.0	
Missing	4	1	.6		
	System	1	.6		
	Total	2	1.1		
Total		181	100.0		

q3 No. employers since graduation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	One	37	20.4	20.6	20.6
	Two	35	19.3	19.4	40.0
	Three	41	22.7	22.8	62.8
	Four	29	16.0	16.1	78.9
	Five or more	38	21.0	21.1	100.0
	Total	180	99.4	100.0	
Missing	System	1	.6		
Total		181	100.0		

q4 Presently unemployed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	42	23.2	23.3	23.3
	No	138	76.2	76.7	100.0
	Total	180	99.4	100.0	
Missing	System	1	.6		
Total		181	100.0		

q5 Present job title/classification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Technician	67	37.0	38.1	38.1
	Foreman/Mgr	19	10.5	10.8	48.9
	Service Rep	12	6.6	6.8	55.7
	Mgmt/Owner	29	16.0	16.5	72.2
	Other	49	27.1	27.8	100.0
	Total	176	97.2	100.0	
Missing	System	5	2.8		
Total		181	100.0		

q6 Nature of employer's business

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dealership/Distributor	56	30.9	32.0	32.0
	Manufacturer	33	18.2	18.9	50.9
	Educational institution	7	3.9	4.0	54.9
	Specialty shop	4	2.2	2.3	57.1
	Other	75	41.4	42.9	100.0
	Total	175	96.7	100.0	
Missing	System	6	3.3		
Total		181	100.0		

q7 Industry employer serves

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture	14	7.7	14.3	14.3
	Automotive	34	18.8	34.7	49.0
	Construction	44	24.3	44.9	93.9
	Forestry	4	2.2	4.1	98.0
	Generator sets	2	1.1	2.0	100.0
	Total	98	54.1	100.0	
Missing	System	83	45.9		
Total		181	100.0		

q8 Industry employer serves (cont'd)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Marine	2	1.1	1.9	1.9
	Refrigeration	1	.6	1.0	2.9
	Trucking	58	32.0	55.8	58.7
	Other	43	23.8	41.3	100.0
	Total	104	57.5	100.0	
Missing	5	2	1.1		
	System	75	41.4		
	Total	77	42.5		
Total		181	100.0		

q9 Type of institution where teach

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School	2	1.1	12.5	12.5
	Career Center	7	3.9	43.8	56.3
	Community/Junior Coll	1	.6	6.3	62.5
	Four-yr Coll/Univ	2	1.1	12.5	75.0
	Mfr/Distrib/Dealership	4	2.2	25.0	100.0
	Total	16	8.8	100.0	
Missing	System	165	91.2		
Total		181	100.0		

q10 Mos. work before did more school

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-6 months	63	34.8	38.4	38.4
	7-12 months	40	22.1	24.4	62.8
	13-18 months	14	7.7	8.5	71.3
	19-24 months	8	4.4	4.9	76.2
	More than 24 mos	39	21.5	23.8	100.0
	Total	164	90.6	100.0	
Missing	System	17	9.4		
Total		181	100.0		

q11 Nature of 1st employer's business

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dealership/Distributor	82	45.3	47.4	47.4
	Manufacturer	25	13.8	14.5	61.8
	Educational institution	5	2.8	2.9	64.7
	Specialty shop	2	1.1	1.2	65.9
	Other	59	32.6	34.1	100.0
	Total	173	95.6	100.0	
Missing	System	8	4.4		
Total		181	100.0		

q12 Industry 1st employer served

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture	16	8.8	15.7	15.7
	Automotive	35	19.3	34.3	50.0
	Construction	48	26.5	47.1	97.1
	Forestry	3	1.7	2.9	100.0
	Total	102	56.4	100.0	
Missing	System	79	43.6		
Total		181	100.0		

q13 Industry 1st employer served (cont'd)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Marine	3	1.7	3.1	3.1
	Refrigeration	3	1.7	3.1	6.2
	Trucking	70	38.7	72.2	78.4
	Other	21	11.6	21.6	100.0
	Total	97	53.6	100.0	
Missing	5	1	.6		
	System	83	45.9		
	Total	84	46.4		
Total		181	100.0		

q14 Serve specif time as trainee (1st job)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	59	32.6	33.3	33.3
	No	118	65.2	66.7	100.0
	Total	177	97.8	100.0	
Missing	System	4	2.2		
Total		181	100.0		

q15 How many mos serve as trainee

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 month	9	5.0	15.0	15.0
	1-6 months	31	17.1	51.7	66.7
	7-12 months	9	5.0	15.0	81.7
	More than 12 mos	8	4.4	13.3	95.0
	More than 24 mos	3	1.7	5.0	100.0
	Total	60	33.1	100.0	
Missing	System	121	66.9		
Total		181	100.0		

q16 FSU education prepare you

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	157	86.7	87.7	87.7
	No	22	12.2	12.3	100.0
	Total	179	98.9	100.0	
Missing	System	2	1.1		
Total		181	100.0		

q18 Any degrees besides Hvy Equip Svc

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	63	34.8	35.8	35.8
	No	113	62.4	64.2	100.0
	Total	176	97.2	100.0	
Missing	System	5	2.8		
Total		181	100.0		

q19a If yes: Automotive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not checked	51	28.2	83.6	83.6
	Checked	10	5.5	16.4	100.0
	Total	61	33.7	100.0	
Missing	System	120	66.3		
Total		181	100.0		

q19b If yes: Automotive Heavy Equip (AHEM)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not checked	37	20.4	60.7	60.7
	Checked	24	13.3	39.3	100.0
	Total	61	33.7	100.0	
Missing	System	120	66.3		
Total		181	100.0		

q19c If yes: Trade Technical Teaching

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not checked	45	24.9	73.8	73.8
	Checked	16	8.8	26.2	100.0
	Total	61	33.7	100.0	
Missing	System	120	66.3		
Total		181	100.0		

q19d If yes: Business

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not checked	49	27.1	80.3	80.3
	Checked	12	6.6	19.7	100.0
	Total	61	33.7	100.0	
Missing	System	120	66.3		
Total		181	100.0		

q19e If yes: Engineering

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not checked	57	31.5	93.4	93.4
	Checked	4	2.2	6.6	100.0
	Total	61	33.7	100.0	
Missing	System	120	66.3		
Total		181	100.0		

q21 Air brakes troubleshoot'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	22	12.2	18.5	18.5
	Seldom	24	13.3	20.2	38.7
	Sometimes	30	16.6	25.2	63.9
	Very Often	43	23.8	36.1	100.0
	Total	119	65.7	100.0	
Missing	5	1	.6		
	System	61	33.7		
	Total	62	34.3		
Total		181	100.0		

q22 Hydraulic brakes troubleshoot'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	19	10.5	16.0	16.0
	Seldom	39	21.5	32.8	48.7
	Sometimes	39	21.5	32.8	81.5
	Very Often	22	12.2	18.5	100.0
	Total	119	65.7	100.0	
Missing	5	1	.6		
	System	61	33.7		
	Total	62	34.3		
Total		181	100.0		

q23 Rebuild of major brake components

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	23	12.7	19.5	19.5
	Seldom	32	17.7	27.1	46.6
	Sometimes	32	17.7	27.1	73.7
	Very Often	31	17.1	26.3	100.0
	Total	118	65.2	100.0	
Missing	5	1	.6		
	System	62	34.3		
	Total	63	34.8		
Total		181	100.0		

q24 Turn brake drums or rotors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	89	49.2	74.8	74.8
	Seldom	13	7.2	10.9	85.7
	Sometimes	6	3.3	5.0	90.8
	Very Often	11	6.1	9.2	100.0
	Total	119	65.7	100.0	
Missing	5	1	.6		
	System	61	33.7		
	Total	62	34.3		
Total		181	100.0		

q25 Air condition'g system troubleshoot'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	27	14.9	23.3	23.3
	Seldom	16	8.8	13.8	37.1
	Sometimes	28	15.5	24.1	61.2
	Very Often	45	24.9	38.8	100.0
	Total	116	64.1	100.0	
Missing	5	3	1.7		
	System	62	34.3		
	Total	65	35.9		
Total		181	100.0		

q26 Air condition'g component rebuild'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	80	44.2	69.0	69.0
	Seldom	20	11.0	17.2	86.2
	Sometimes	8	4.4	6.9	93.1
	Very Often	8	4.4	6.9	100.0
	Total	116	64.1	100.0	
Missing	5	2	1.1		
	System	63	34.8		
	Total	65	35.9		
Total		181	100.0		

q27 Diesel engine overhaul

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	25	13.8	21.2	21.2
	Seldom	25	13.8	21.2	42.4
	Sometimes	35	19.3	29.7	72.0
	Very Often	33	18.2	28.0	100.0
	Total	118	65.2	100.0	
Missing	5	2	1.1		
	System	61	33.7		
	Total	63	34.8		
Total		181	100.0		

q28 Gasoline engine overhaul

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	51	28.2	43.2	43.2
	Seldom	37	20.4	31.4	74.6
	Sometimes	19	10.5	16.1	90.7
	Very Often	11	6.1	9.3	100.0
	Total	118	65.2	100.0	
Missing	5	2	1.1		
	System	61	33.7		
	Total	63	34.8		
Total		181	100.0		

q29 LP gas engine overhaul

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	93	51.4	80.2	80.2
	Seldom	15	8.3	12.9	93.1
	Sometimes	4	2.2	3.4	96.6
	Very Often	4	2.2	3.4	100.0
	Total	116	64.1	100.0	
Missing	5	2	1.1		
	System	63	34.8		
	Total	65	35.9		
Total		181	100.0		

q30 Differential cone point setting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	59	32.6	50.9	50.9
	Seldom	34	18.8	29.3	80.2
	Sometimes	14	7.7	12.1	92.2
	Very Often	9	5.0	7.8	100.0
	Total	116	64.1	100.0	
Missing	5	2	1.1		
	System	63	34.8		
	Total	65	35.9		
Total		181	100.0		

q31 Rebuild planetary sets or hubs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	55	30.4	46.6	46.6
	Seldom	17	9.4	14.4	61.0
	Sometimes	33	18.2	28.0	89.0
	Very Often	13	7.2	11.0	100.0
	Total	118	65.2	100.0	
Missing	5	2	1.1		
	System	61	33.7		
	Total	63	34.8		
Total		181	100.0		

q32 Carburetion system troubleshoot'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	43	23.8	36.8	36.8
	Seldom	44	24.3	37.6	74.4
	Sometimes	22	12.2	18.8	93.2
	Very Often	8	4.4	6.8	100.0
	Total	117	64.6	100.0	
Missing	5	2	1.1		
	System	62	34.3		
	Total	64	35.4		
Total		181	100.0		

q33 Carburetor overhaul

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	63	34.8	53.8	53.8
	Seldom	27	14.9	23.1	76.9
	Sometimes	17	9.4	14.5	91.5
	Very Often	10	5.5	8.5	100.0
	Total	117	64.6	100.0	
Missing	5	2	1.1		
	System	62	34.3		
	Total	64	35.4		
Total		181	100.0		

q34 Diesel injection system troubleshoot'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	12	6.6	10.2	10.2
	Seldom	14	7.7	11.9	22.0
	Sometimes	43	23.8	36.4	58.5
	Very Often	49	27.1	41.5	100.0
	Total	118	65.2	100.0	
Missing	5	2	1.1		
	System	61	33.7		
	Total	63	34.8		
Total		181	100.0		

q35 Diesel injection cleaning & setting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	43	23.8	36.8	36.8
	Seldom	23	12.7	19.7	56.4
	Sometimes	33	18.2	28.2	84.6
	Very Often	18	9.9	15.4	100.0
	Total	117	64.6	100.0	
Missing	5	2	1.1		
	System	62	34.3		
	Total	64	35.4		
Total		181	100.0		

q36 Diesel injection pump overhaul

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	84	46.4	71.8	71.8
	Seldom	14	7.7	12.0	83.8
	Sometimes	10	5.5	8.5	92.3
	Very Often	9	5.0	7.7	100.0
	Total	117	64.6	100.0	
Missing	5	2	1.1		
	System	62	34.3		
	Total	64	35.4		
Total		181	100.0		

q37 Diesel injection pump calibration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	84	46.4	71.8	71.8
	Seldom	15	8.3	12.8	84.6
	Sometimes	9	5.0	7.7	92.3
	Very Often	9	5.0	7.7	100.0
	Total	117	64.6	100.0	
Missing	5	2	1.1		
	System	62	34.3		
	Total	64	35.4		
Total		181	100.0		

q38 Electronic fuel injection systems svc'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	33	18.2	28.2	28.2
	Seldom	24	13.3	20.5	48.7
	Sometimes	30	16.6	25.6	74.4
	Very Often	30	16.6	25.6	100.0
	Total	117	64.6	100.0	
Missing	5	2	1.1		
	System	62	34.3		
	Total	64	35.4		
Total		181	100.0		

q39 Electrical light'g system troubleshoot'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	13	7.2	11.2	11.2
	Seldom	5	2.8	4.3	15.5
	Sometimes	27	14.9	23.3	38.8
	Very Often	71	39.2	61.2	100.0
	Total	116	64.1	100.0	
Missing	5	2	1.1		
	System	63	34.8		
	Total	65	35.9		
Total		181	100.0		

q40 Electrical troubleshoot'g start'g & charg'g syst's

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	11	6.1	9.3	9.3
	Seldom	7	3.9	5.9	15.3
	Sometimes	26	14.4	22.0	37.3
	Very Often	74	40.9	62.7	100.0
	Total	118	65.2	100.0	
Missing	5	2	1.1		
	System	61	33.7		
	Total	63	34.8		
Total		181	100.0		

q41 Electrical troubleshoot'g ignition systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	22	12.2	18.6	18.6
	Seldom	32	17.7	27.1	45.8
	Sometimes	33	18.2	28.0	73.7
	Very Often	31	17.1	26.3	100.0
	Total	118	65.2	100.0	
Missing	5	2	1.1		
	System	61	33.7		
	Total	63	34.8		
Total		181	100.0		

q42 Electrical troubleshoot'g computer ctrl syst's

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	16	8.8	13.7	13.7
	Seldom	23	12.7	19.7	33.3
	Sometimes	33	18.2	28.2	61.5
	Very Often	45	24.9	38.5	100.0
	Total	117	64.6	100.0	
Missing	5	3	1.7		
	System	61	33.7		
	Total	64	35.4		
Total		181	100.0		

q43 Generator or alternator rebuild'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	85	47.0	73.3	73.3
	Seldom	13	7.2	11.2	84.5
	Sometimes	11	6.1	9.5	94.0
	Very Often	7	3.9	6.0	100.0
	Total	116	64.1	100.0	
Missing	5	3	1.7		
	System	62	34.3		
	Total	65	35.9		
Total		181	100.0		

q44 Starter rebuild'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	86	47.5	74.1	74.1
	Seldom	12	6.6	10.3	84.5
	Sometimes	12	6.6	10.3	94.8
	Very Often	6	3.3	5.2	100.0
	Total	116	64.1	100.0	
Missing	5	3	1.7		
	System	62	34.3		
	Total	65	35.9		
Total		181	100.0		

q45 Electronic ignition systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	36	19.9	30.8	30.8
	Seldom	45	24.9	38.5	69.2
	Sometimes	24	13.3	20.5	89.7
	Very Often	12	6.6	10.3	100.0
	Total	117	64.6	100.0	
Missing	5	2	1.1		
	System	62	34.3		
	Total	64	35.4		
Total		181	100.0		

q46 Ignition system scope analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	97	53.6	84.3	84.3
	Seldom	11	6.1	9.6	93.9
	Sometimes	2	1.1	1.7	95.7
	Very Often	5	2.8	4.3	100.0
	Total	115	63.5	100.0	
Missing	5	2	1.1		
	System	64	35.4		
	Total	66	36.5		
Total		181	100.0		

q47 Hydraulics troubleshoot'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	19	10.5	16.2	16.2
	Seldom	16	8.8	13.7	29.9
	Sometimes	33	18.2	28.2	58.1
	Very Often	49	27.1	41.9	100.0
	Total	117	64.6	100.0	
Missing	5	2	1.1		
	System	62	34.3		
	Total	64	35.4		
Total		181	100.0		

q48 Hydraulics component rebuild'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	36	19.9	31.0	31.0
	Seldom	19	10.5	16.4	47.4
	Sometimes	26	14.4	22.4	69.8
	Very Often	35	19.3	30.2	100.0
	Total	116	64.1	100.0	
Missing	5	2	1.1		
	System	63	34.8		
	Total	65	35.9		
Total		181	100.0		

q49 Manual transmission rebuild'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	51	28.2	43.6	43.6
	Seldom	31	17.1	26.5	70.1
	Sometimes	23	12.7	19.7	89.7
	Very Often	12	6.6	10.3	100.0
	Total	117	64.6	100.0	
Missing	5	2	1.1		
	System	62	34.3		
	Total	64	35.4		
Total		181	100.0		

q50 Automatic/pwrshift trans. troubleshoot'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	31	17.1	26.5	26.5
	Seldom	32	17.7	27.4	53.8
	Sometimes	28	15.5	23.9	77.8
	Very Often	26	14.4	22.2	100.0
	Total	117	64.6	100.0	
Missing	5	1	.6		
	System	63	34.8		
	Total	64	35.4		
Total		181	100.0		

q51 Automatic/pwrshift trans. rebuild'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	62	34.3	53.0	53.0
	Seldom	22	12.2	18.8	71.8
	Sometimes	20	11.0	17.1	88.9
	Very Often	13	7.2	11.1	100.0
	Total	117	64.6	100.0	
Missing	5	1	.6		
	System	63	34.8		
	Total	64	35.4		
Total		181	100.0		

q52 Hydrostatic transmission troubleshoot'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	50	27.6	43.1	43.1
	Seldom	25	13.8	21.6	64.7
	Sometimes	23	12.7	19.8	84.5
	Very Often	18	9.9	15.5	100.0
	Total	116	64.1	100.0	
Missing	5	2	1.1		
	System	63	34.8		
	Total	65	35.9		
Total		181	100.0		

q53 Suspension system alignment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	56	30.9	48.3	48.3
	Seldom	29	16.0	25.0	73.3
	Sometimes	20	11.0	17.2	90.5
	Very Often	11	6.1	9.5	100.0
	Total	116	64.1	100.0	
Missing	5	2	1.1		
	System	63	34.8		
	Total	65	35.9		
Total		181	100.0		

q54 Suspension system alignment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	55	30.4	50.0	50.0
	Seldom	27	14.9	24.5	74.5
	Sometimes	19	10.5	17.3	91.8
	Very Often	9	5.0	8.2	100.0
	Total	110	60.8	100.0	
Missing	5	2	1.1		
	System	69	38.1		
	Total	71	39.2		
Total		181	100.0		

q55 Suspension system rebuild'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	37	20.4	31.9	31.9
	Seldom	31	17.1	26.7	58.6
	Sometimes	32	17.7	27.6	86.2
	Very Often	16	8.8	13.8	100.0
	Total	116	64.1	100.0	
Missing	5	2	1.1		
	System	63	34.8		
	Total	65	35.9		
Total		181	100.0		

q56 Front axle rebuild'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	39	21.5	33.9	33.9
	Seldom	29	16.0	25.2	59.1
	Sometimes	36	19.9	31.3	90.4
	Very Often	11	6.1	9.6	100.0
	Total	115	63.5	100.0	
Missing	5	3	1.7		
	System	63	34.8		
	Total	66	36.5		
Total		181	100.0		

q57 Pin & bush track systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	71	39.2	61.7	61.7
	Seldom	20	11.0	17.4	79.1
	Sometimes	10	5.5	8.7	87.8
	Very Often	14	7.7	12.2	100.0
	Total	115	63.5	100.0	
Missing	5	2	1.1		
	System	64	35.4		
	Total	66	36.5		
Total		181	100.0		

q58 Take FSU courses to update skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	65	35.9	54.2	54.2
	No	55	30.4	45.8	100.0
	Total	120	66.3	100.0	
Missing	System	61	33.7		
Total		181	100.0		

Section 03. Employer follow-up survey

No employer follow-up survey was conducted. We are substituting data received from employer evaluations of HET internship students.

Analysis of employer's responses to questions addressing students' work performance:

- Quality of work – 85% received a rating of excellent to very good.
- Quantity of work – 85% received a rating of high output to more than average.
- Students' performance grades by employers – 77% of the internship students would have received an "A."
- Question asked of employers, "Would you hire this student?" 100% of the employers indicated they would hire the internship student.

Ferris State University

EMPLOYER'S EVALUATION OF INTERNSHIP STUDENT
AAS Degree

Student's Name_____ Date _____

Supervisor's Name_____ Title _____

Company's Name_____

Company's Address_____

INSTRUCTIONS: The immediate supervisor is asked to evaluate the student objectively, comparing him/her with other students of comparable academic level, similar age and experience groups, and with other personnel assigned to the same or similarly classified jobs.

ATTITUDE-APPLICATION TO WORK	ABILITY TO LEARN
_____ Outstanding in enthusiasm	_____ Learned work exceptionally well
_____ Very interested and industrious	_____ Learned work readily
_____ Average in diligence and interest	_____ Average in understanding work
_____ Somewhat indifferent	_____ Rather slow in learning
_____ Definitely not interested	_____ Very slow to learn
DEPENDABILITY	INITIATIVE
_____ Completely dependable	_____ Proceeds well on his own
_____ Above average in dependability	_____ Goes ahead independently at times
_____ Usually dependable	_____ Does all assigned work
_____ Sometimes neglectful or careless	_____ Hesitates
_____ Unreliable	_____ Must be pushed frequently
QUALITY OF WORK	RELATIONS WITH OTHERS
_____ Excellent	_____ Exceptionally well accepted
_____ Very Good	_____ Works well with others
_____ Average	_____ Gets along satisfactorily
_____ Below average	_____ Has difficulty working with others
_____ Very poor	
MATURITY-POISE	QUALITY OF WORK
_____ Quite poised and confident	_____ Usually high output
_____ Has good self-assurance	_____ More than average
_____ Average maturity and poise	_____ Normal amount
_____ Seldom asserts himself	_____ Below average
_____ Timid	_____ Low output, slow
_____ Brash	

JUDGEMENT	ATTENDANCE
_____ Exceptionally mature in judgement	_____ Regular
_____ Above average in making decisions	_____ Irregular
_____ Usually makes the right decision	PUNCTUALITY
_____ Often uses poor judgement	_____ Regular
_____ Consistently uses bad judgement	_____ Irregular

What is your opinion of the future success of this student in the heavy equipment field:
_____Excellent _____ Very Good _____ Average _____ Below Average _____Very Poor

Additional Comments:_____

How would you rate this student's overall performance: (please circle the appropriate grade)

Outstanding	Very Good	Average	Marginal	Unsatisfactory
A A-	B+ B B-	C+ C C-	D+ D	D- F

What strong characteristics does this student possess:

What weak characteristics do you feel may hinder this student's future success:

Is this student the type of person you consider for permanent employment? (NOTE: An affirmative answer does not commit you to hire this student.)

Did you discuss this evaluation with the student: _____Yes _____ No

Supervisor's Signature_____

Section 04. Student Evaluation of Instruction

a) Population

b) Survey results

Heavy Equipment Technology

APRC 2004-2005

Section 2 of 3

a) Population

- Students currently enrolled in the HET programs – 82
- 59 valid surveys

b) Analysis of Survey Questions

- All the courses offered in the A.A.S. and BS degree curriculum received, on an average, an excellent to good rating.
- Time used in HET classes – A majority of the students rated time usage as excellent to good.
- Teacher knowledge – A majority of the students rated teacher knowledge as excellent to good.
- Teacher ability – A majority of the students rated teacher ability as excellent to good.
- Classroom/Lab facilities – A majority of the students rated the Heavy Equipment center classroom/lab facilities as excellent to good.
- Lab experience – A majority of the students rated time spent in lab as excellent to good.

Ferris State University
Heavy Equipment Technology
Current Student Survey

General Directions: Please complete **ALL** responses that apply by filling in the corresponding answer on the answer sheet. For the category "OTHER_____" or comments at the end of the survey, please record your answers directly on the survey form. Your frank response is very important for the improvement and continued success of the Heavy Equipment program.

Section 1 - General Information

1. What degree are you seeking?
   - ☐ 1-Associates
   - ☐ 2-Bachelors
   - ☐ 3-Both

2. What semester are you currently enrolled in?
   - ☐ 1-1st
   - ☐ 2-2nd
   - ☐ 3-3rd
   - ☐ 4-4th

Go to Question 3 for more choices.

3. Continuation of Question 2.
   - ☐ 5-5th
   - ☐ 6-6th
   - ☐ 7-7th
   - ☐ 8-8th
   - ☐ Other_____

4. What prompted your interest in the Ferris State University Heavy Equipment Program?
   - ☐ 1-Counselor
   - ☐ 2-Teacher
   - ☐ 3-Friend(s)
   - ☐ 4-Parent(s)
   - ☐ 5-Other_____

5. What are your plans or goals after completing your Ferris degree(s)?
   - ☐ 1-Work Where:_____
   - ☐ 2-Further education _____
   - ☐ 3-Work and education
   - ☐ 4-Other_____

Section 2 - Course Subject Matter

Please choose the number that best describes the value of the subject matter covered in the following classes? **Choose only one answer for each question and comment on any of the questions rated Fair or Poor.**

6. HEQT-100 Troubleshooting Strategies
   - ☐ 1-Have not taken
   - ☐ 2-Excellent
   - ☐ 3-Good
   - ☐ 4-Fair
   - ☐ 5-Poor

   Comments:_____

7. HEQT-101 Maintenance Fundamentals
   - ☐ 1-Have not taken
   - ☐ 2-Excellent
   - ☐ 3-Good
   - ☐ 4-Fair
   - ☐ 5-Poor

   Comments:_____

8. HEQT-110 Electronics Fundamentals
   - ☐ 1-Have not taken
   - ☐ 2-Excellent
   - ☐ 3-Good
   - ☐ 4-Fair
   - ☐ 5-Poor

   Comments:_____

9. HEQT-120 Engine Technology
   - ☐ 1-Have not taken
   - ☐ 2-Excellent
   - ☐ 3-Good
   - ☐ 4-Fair
   - ☐ 5-Poor

   Comments:_____

10. HEQT-160 Fluid Power Fundamentals
    - ☐ 1-Have not taken
    - ☐ 2-Excellent
    - ☐ 3-Good
    - ☐ 4-Fair
    - ☐ 5-Poor

    Comments:_____

11. HEQT-193 Industry Internship
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

12. HEQT-200 Planned Maintenance Systems
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

13. HEQT-201 Transport Refrigeration
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

14. HEQT-210 Electrical Systems
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

15. HEQT-230 Diesel Fuel Systems Technology
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

16. HEQT-240 Brakes & Suspension Systems
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

17. HEQT-270 Power Transfer Technology
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

18. HEQT-271 Automatic Transmissions
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

19. HSET-300 Applied Failure Analysis
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

20. HSET-302 Fleet Management
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

21. HSET-393 Industry Internship
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

22. HSET-460 Advanced Hydraulic Systems
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

23. HSET-410 Interactive Electronic Controls
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

24. HSET-403 Testing Systems and Analysis
- ☐ 1-Have not taken
- ☐ 2-Excellent
- ☐ 3-Good
- ☐ 4-Fair
- ☐ 5-Poor

Comments:_____

Section 3 – Course Presentation

Please comment on all replies that you rated as Fair, Poor or Other. Be specific as to the course(s), instructor(s) and any specific problems.

25. How would you describe the time used in the Heavy Equipment classes?
- ☐ 1-Excellent
- ☐ 2-Good
- ☐ 3-Fair
- ☐ 4-Poor
- ☐ 5-Other_____

26. How would you rate the teacher's knowledge of the subject matter presented?

- ☐ 1-Excellent
- ☐ 2-Good
- ☐ 3-Fair
- ☐ 4-Poor
- ☐ 5-Other_____

27. How would you rate the teachers' availability, helpfulness and courteousness?

- ☐ 1-Excellent
- ☐ 2-Good
- ☐ 3-Fair
- ☐ 4-Poor
- ☐ 5-Other_____

28. How would you rate the facilities overall appearance and set-up?

- ☐ 1-Excellent
- ☐ 2-Good
- ☐ 3-Fair
- ☐ 4-Poor
- ☐ 5-Other_____

29. How would you rate your course lab experiences?

- ☐ 1-Excellent
- ☐ 2-Good
- ☐ 3-Fair
- ☐ 4-Poor
- ☐ 5-Other_____

30. How would rate the availability of shop tools?

- ☐ 1-Excellent
- ☐ 2-Good
- ☐ 3-Fair
- ☐ 4-Poor
- ☐ 5-Other_____

31. How do the technical related classes conform to the program goals of preparing you to be a heavy equipment technician?

- ☐ 1-Excellent
- ☐ 2-Good
- ☐ 3-Fair
- ☐ 4-Poor
- ☐ 5-Other_____

32. Do you feel the classes are sequenced properly?

- ☐ 1-Yes
- ☐ 2-No

Comments:_____

33. What two changes would you make to the program?

a. _____

b._____

Section 4 - Certificate Classes

34. Did you take any certificate classes?

- ☐ 1-Yes
- ☐ 2-No

35. If you answered **Yes** to the above question, which certification class did you take? If you answered **No** to the above question, continue to the ***Additional Comments*** section on the next page.

- ☐ 1-Komatsu
- ☐ 2-Electrical Power Generation
- ☐ 3-Both

36. How beneficial was the Komatsu course material?

- ☐ 1-Excellent
- ☐ 2-Good
- ☐ 3-Fair
- ☐ 4-Poor
- ☐ 5-Didn't take

37. How beneficial was the Electrical Power Generation course material?

- ☐ 1-Excellent
- ☐ 2-Good
- ☐ 3-Fair
- ☐ 4-Poor
- ☐ 5-Didn't take

38. In the certificate classes, was the equipment adequate? Please comment on Fair, Poor or Other responses.

- ☐ 1-Excellent
- ☐ 2-Good
- ☐ 3-Fair _____
- ☐ 4-Poor _____
- ☐ 5-Other_____

39. How did you find out about the certificate classes?

- ☐ 1-Curriculum check sheet
- ☐ 2-Word of mouth
- ☐ 3-Advisor
- ☐ 4-Instructor
- ☐ 5-Other_____

Additional comments on any other matter related to assessing your education at Ferris State University:

HEQT Student Survey...2004 Fall

Frequencies

Prepared by: Institutional Research & Testing, 11/04

Statistics

	N				
	Valid	Missing	Mean	Median	Std. Deviation
q1 Degree seeking	59	0	1.98	2.00	.799
q2 Sem currently enrolled in	49	10	1.88	1.00	.992
q3 Sem enrolled (cont'd)	21	38	3.29	3.00	1.189
q4a Prompted interest: Counselor	59	0	.15	.00	.363
q4b Prompted interest: Teacher	59	0	.19	.00	.393
q4c Prompted interest: Friend(s)	59	0	.15	.00	.363
q4d Prompted interest: Parent(s)	59	0	.17	.00	.378
q4e Prompted interest: Other	59	0	.41	.00	.495
q5 Plans/goals after grad	59	0	1.51	1.00	.858
q6 HEQT100 Troubleshooting strategies	59	0	3.07	3.00	.848
q7 HEQT101 Maintenance Fundamentals	59	0	3.24	3.00	.858
q8 HEQT110 Electronics Fundamentals	59	0	2.71	3.00	.911
q9 HEQT120 Engine Technology	58	1	2.00	1.50	1.139
q10 HEQT160 Fluid Power Fundamentals	59	0	1.76	1.00	1.023
q11 HEQT193 Industry Internship	59	0	1.61	1.00	1.051
q12 HEQT200 Planned Maintenance Syst's	59	0	2.12	1.00	1.463
q13 HEQT201 Transport Refrigeration	59	0	1.93	1.00	1.081
q14 HEQT210 Electrical Systems	59	0	1.59	1.00	.833
q15 HEQT230 Diesel Fuel Syst Tech	59	0	1.49	1.00	1.120
q16 HEQT240 Brakes & Suspension Syst's	59	0	1.88	1.00	1.084
q17 HEQT270 Power Transfer Tech	59	0	1.68	1.00	.880
q18 HEQT271 Automatic Transmission	59	0	1.19	1.00	.473
q19 HEQT300 Applied Failure Analysis	59	0	1.36	1.00	1.095
q20 HEQT302 Fleet Mgmt	59	0	1.29	1.00	.929
q21 HEQT393 Industry Internship	59	0	1.14	1.00	.472
q22 HEQT460 Advanced Hydraulic Syst's	59	0	1.24	1.00	.567
q23 HEQT410 Interactive Electronic Ctrls	59	0	1.00	1.00	.000
q24 HEQT403 Testing Syst's & Analysis	59	0	1.00	1.00	.000
q25 Time used in HEQT classes	59	0	2.41	2.00	.746
q26 Teacher's knowledge	59	0	1.95	2.00	.818
q27 Teachers' availability, etc.	58	1	1.88	2.00	.860
q28 Facilities' overall look & set-up	58	1	2.02	2.00	.761
q29 Course lab experiences	58	1	2.24	2.00	.709
q30 Availability of shop tools	57	2	2.75	3.00	.987
q31 Tec classes conform to goals	58	1	2.17	2.00	.729
q32 Classes properly sequenced	58	1	1.24	1.00	.432
q34 Take certificate classes	52	7	1.85	2.00	.364
q35 Which cert classes	8	51	2.00	2.00	.535
q36 Komatsu beneficial	19	40	4.58	5.00	1.017
q37 Elect Pwr Generation beneficial	20	39	3.80	4.50	1.508
q38 Cert class equipmt adequate	14	45	3.86	4.50	1.292
q39 How find out about cert classes	12	47	3.17	2.50	1.697

Frequency Table

q1 Degree seeking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Associates	19	32.2	32.2	32.2
	Bachelors	22	37.3	37.3	69.5
	Both	18	30.5	30.5	100.0
	Total	59	100.0	100.0	

q2 Sem currently enrolled in

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1st	26	44.1	53.1	53.1
	2nd	4	6.8	8.2	61.2
	3rd	18	30.5	36.7	98.0
	4th	1	1.7	2.0	100.0
	Total	49	83.1	100.0	
Missing	System	10	16.9		
Total		59	100.0		

q3 Sem enrolled (cont'd)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5th	2	3.4	9.5	9.5
	6th	2	3.4	9.5	19.0
	7th	9	15.3	42.9	61.9
	8th	4	6.8	19.0	81.0
	Other	4	6.8	19.0	100.0
	Total	21	35.6	100.0	
Missing	System	38	64.4		
Total		59	100.0		

q4a Prompted interest: Counselor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	50	84.7	84.7	84.7
	Yes	9	15.3	15.3	100.0
	Total	59	100.0	100.0	

q4b Prompted interest: Teacher

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	48	81.4	81.4	81.4
	Yes	11	18.6	18.6	100.0
	Total	59	100.0	100.0	

q4c Prompted interest: Friend(s)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	50	84.7	84.7	84.7
	Yes	9	15.3	15.3	100.0
	Total	59	100.0	100.0	

q4d Prompted interest: Parent(s)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	49	83.1	83.1	83.1
	Yes	10	16.9	16.9	100.0
	Total	59	100.0	100.0	

q4e Prompted interest: Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	35	59.3	59.3	59.3
	Yes	24	40.7	40.7	100.0
	Total	59	100.0	100.0	

q5 Plans/goals after grad

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Work	43	72.9	72.9	72.9
	Further education	2	3.4	3.4	76.3
	Work & education	14	23.7	23.7	100.0
	Total	59	100.0	100.0	

q6 HEQT100 Troubleshooting strategies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	1	1.7	1.7	1.7
	Excellent	12	20.3	20.3	22.0
	Good	32	54.2	54.2	76.3
	Fair	10	16.9	16.9	93.2
	Poor	4	6.8	6.8	100.0
	Total	59	100.0	100.0	

q7 HEQT101 Maintenance Fundamentals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	1	1.7	1.7	1.7
	Excellent	8	13.6	13.6	15.3
	Good	31	52.5	52.5	67.8
	Fair	14	23.7	23.7	91.5
	Poor	5	8.5	8.5	100.0
	Total	59	100.0	100.0	

q8 HEQT110 Electronics Fundamentals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	4	6.8	6.8	6.8
	Excellent	20	33.9	33.9	40.7
	Good	27	45.8	45.8	86.4
	Fair	5	8.5	8.5	94.9
	Poor	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

q9 HEQT120 Engine Technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	29	49.2	50.0	50.0
	Excellent	6	10.2	10.3	60.3
	Good	19	32.2	32.8	93.1
	Fair	2	3.4	3.4	96.6
	Poor	2	3.4	3.4	100.0
	Total	58	98.3	100.0	
Missing	System	1	1.7		
Total		59	100.0		

q10 HEQT160 Fluid Power Fundamentals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	34	57.6	57.6	57.6
	Excellent	9	15.3	15.3	72.9
	Good	13	22.0	22.0	94.9
	Fair	2	3.4	3.4	98.3
	Poor	1	1.7	1.7	100.0
	Total	59	100.0	100.0	

q11 HEQT193 Industry Internship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	39	66.1	66.1	66.1
	Excellent	10	16.9	16.9	83.1
	Good	7	11.9	11.9	94.9
	Poor	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

q12 HEQT200 Planned Maintenance Syst's

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	35	59.3	59.3	59.3
	Excellent	1	1.7	1.7	61.0
	Good	9	15.3	15.3	76.3
	Fair	9	15.3	15.3	91.5
	Poor	5	8.5	8.5	100.0
	Total	59	100.0	100.0	

q13 HEQT201 Transport Refrigeration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	31	52.5	52.5	52.5
	Excellent	5	8.5	8.5	61.0
	Good	20	33.9	33.9	94.9
	Fair	2	3.4	3.4	98.3
	Poor	1	1.7	1.7	100.0
	Total	59	100.0	100.0	

q14 HEQT210 Electrical Systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	36	61.0	61.0	61.0
	Excellent	12	20.3	20.3	81.4
	Good	10	16.9	16.9	98.3
	Fair	1	1.7	1.7	100.0
	Total	59	100.0	100.0	

q15 HEQT230 Diesel Fuel Syst Tech

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	48	81.4	81.4	81.4
	Excellent	1	1.7	1.7	83.1
	Good	5	8.5	8.5	91.5
	Fair	2	3.4	3.4	94.9
	Poor	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

q16 HEQT240 Brakes & Suspension Syst's

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	33	55.9	55.9	55.9
	Excellent	5	8.5	8.5	64.4
	Good	16	27.1	27.1	91.5
	Fair	5	8.5	8.5	100.0
	Total	59	100.0	100.0	

q17 HEQT270 Power Transfer Tech

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	35	59.3	59.3	59.3
	Excellent	8	13.6	13.6	72.9
	Good	16	27.1	27.1	100.0
	Total	59	100.0	100.0	

q18 HEQT271 Automatic Transmission

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	50	84.7	84.7	84.7
	Excellent	7	11.9	11.9	96.6
	Good	2	3.4	3.4	100.0
	Total	59	100.0	100.0	

q19 HEQT300 Applied Failure Analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	53	89.8	89.8	89.8
	Good	1	1.7	1.7	91.5
	Fair	1	1.7	1.7	93.2
	Poor	4	6.8	6.8	100.0
	Total	59	100.0	100.0	

q20 HEQT302 Fleet Mgmt

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	53	89.8	89.8	89.8
	Excellent	1	1.7	1.7	91.5
	Good	1	1.7	1.7	93.2
	Fair	2	3.4	3.4	96.6
	Poor	2	3.4	3.4	100.0
	Total	59	100.0	100.0	

q21 HEQT393 Industry Internship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	54	91.5	91.5	91.5
	Excellent	2	3.4	3.4	94.9
	Good	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

q22 HEQT460 Advanced Hydraulic Syst's

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	49	83.1	83.1	83.1
	Excellent	6	10.2	10.2	93.2
	Good	4	6.8	6.8	100.0
	Total	59	100.0	100.0	

q23 HEQT410 Interactive Electronic Ctrls

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	59	100.0	100.0	100.0

q24 HEQT403 Testing Syst's & Analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Have not taken	59	100.0	100.0	100.0

q25 Time used in HEQT classes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	3	5.1	5.1	5.1
	Good	34	57.6	57.6	62.7
	Fair	18	30.5	30.5	93.2
	Poor	3	5.1	5.1	98.3
	Other	1	1.7	1.7	100.0
	Total	59	100.0	100.0	

q26 Teacher's knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	15	25.4	25.4	25.4
	Good	36	61.0	61.0	86.4
	Fair	6	10.2	10.2	96.6
	Other	2	3.4	3.4	100.0
	Total	59	100.0	100.0	

q27 Teachers' availability, etc.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	21	35.6	36.2	36.2
	Good	26	44.1	44.8	81.0
	Fair	9	15.3	15.5	96.6
	Poor	1	1.7	1.7	98.3
	Other	1	1.7	1.7	100.0
	Total	58	98.3	100.0	
Missing	System	1	1.7		
Total		59	100.0		

q28 Facilities' overall look & set-up

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	12	20.3	20.7	20.7
	Good	36	61.0	62.1	82.8
	Fair	8	13.6	13.8	96.6
	Poor	1	1.7	1.7	98.3
	Other	1	1.7	1.7	100.0
	Total	58	98.3	100.0	
Missing	System	1	1.7		
Total		59	100.0		

q29 Course lab experiences

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	6	10.2	10.3	10.3
	Good	35	59.3	60.3	70.7
	Fair	14	23.7	24.1	94.8
	Poor	3	5.1	5.2	100.0
	Total	58	98.3	100.0	
Missing	System	1	1.7		
Total		59	100.0		

q30 Availability of shop tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	5	8.5	8.8	8.8
	Good	18	30.5	31.6	40.4
	Fair	23	39.0	40.4	80.7
	Poor	8	13.6	14.0	94.7
	Other	3	5.1	5.3	100.0
	Total	57	96.6	100.0	
Missing	System	2	3.4		
Total		59	100.0		

q31 Tec classes conform to goals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	8	13.6	13.8	13.8
	Good	35	59.3	60.3	74.1
	Fair	12	20.3	20.7	94.8
	Poor	3	5.1	5.2	100.0
	Total	58	98.3	100.0	
Missing	System	1	1.7		
Total		59	100.0		

q32 Classes properly sequenced

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	44	74.6	75.9	75.9
	No	14	23.7	24.1	100.0
	Total	58	98.3	100.0	
Missing	System	1	1.7		
Total		59	100.0		

q34 Take certificate classes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	13.6	15.4	15.4
	No	44	74.6	84.6	100.0
	Total	52	88.1	100.0	
Missing	5	1	1.7		
	System	6	10.2		
	Total	7	11.9		
Total		59	100.0		

q35 Which cert classes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Komatsu	1	1.7	12.5	12.5
	Electr'l Pwr Generat'n	6	10.2	75.0	87.5
	Both	1	1.7	12.5	100.0
	Total	8	13.6	100.0	
Missing	5	2	3.4		
	System	49	83.1		
	Total	51	86.4		
Total		59	100.0		

q36 Komatsu beneficial

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	2	3.4	10.5	10.5
	Fair	1	1.7	5.3	15.8
	Didn't take	16	27.1	84.2	100.0
	Total	19	32.2	100.0	
Missing	System	40	67.8		
Total		59	100.0		

q37 Elect Pwr Generation beneficial

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	3	5.1	15.0	15.0
	Good	1	1.7	5.0	20.0
	Fair	3	5.1	15.0	35.0
	Poor	3	5.1	15.0	50.0
	Didn't take	10	16.9	50.0	100.0
	Total	20	33.9	100.0	
Missing	System	39	66.1		
Total		59	100.0		

q38 Cert class equipmt adequate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	3	5.1	21.4	21.4
	Fair	3	5.1	21.4	42.9
	Poor	1	1.7	7.1	50.0
	Other	7	11.9	50.0	100.0
	Total	14	23.7	100.0	
Missing	System	45	76.3		
Total		59	100.0		

q39 How find out about cert classes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Curriculum check sheet	2	3.4	16.7	16.7
	Word of mouth	4	6.8	33.3	50.0
	Advisor	1	1.7	8.3	58.3
	Other	5	8.5	41.7	100.0
	Total	12	20.3	100.0	
Missing	System	47	79.7		
Total		59	100.0		

Section 05. Faculty Perceptions

a) Resources

b) Admissions standards

c) Degree of commitment by the administration

d) Process and procedures used

e) Overall feelings

a) Resources

The resources available are adequate. As with any other program, there are always new resources on the "wish" list. The equipment, tools and facilities are there to produce good solid technicians for the workforce. Resources that are cutting edge are always desirous but much can be learned with what is currently available.

b) Admissions Standards:

The admissions standards are appropriate. The graduating students bring good value to the workplace upon graduation because of the standards in place.

c) Degree of Commitment by the Administration

The administration including the Department Chair is extremely committed to this program. As a new faculty member and a former student of the program, I am proud to say that the success of the program is job one. Helping me and supporting my efforts in developing my skills is an extension of this commitment. The New Faculty Orientation program, personal development support and all the university resources effectively demonstrate the support for this program.

d) Process and Procedures Used

The processes and procedures used are appropriate for the program. Advisory board, industry and certification procedures are in place to maintain and promote the quality of the program. The program is administered very efficiently for the number of faculty and staff. Students get problems solved and answers to questions – not a run around.

e) Overall Feelings

I feel this program is on the cusp of a significant upturn. As global markets stiffen, competition for well paying careers, skills like those acquired in Heavy Equipment will be in demand. A broken down truck or piece of equipment needs to be fixed right here in Michigan. Jobs like our students get are not subject to international outsourcing. The mere fact that we have students from Botswana and New Caledonia support this claim. As our governor seeks to increase college enrollment in Michigan, programs like Heavy Equipment are going to provide highly skilled workers that will have opportunities right here.

Section 06. Advisory Committee Perceptions

a) Population

b) Survey results

a) Population

- 15 surveys sent
- 7 valid surveys returned

b) Analysis of Survey Questions

- Practical skills taught by HET programs – 100% strongly agreed that the HET program instruction provides students with practical skills and knowledge experiences.
- Advisory Board meets often enough – 71% strongly agreed
- Adequate communication between HET and the Advisory Board – 86% strongly agreed.
- HET program curriculums are periodically reviewed and revised to keep current with changing job practices and technology – 100% strongly agreed.
- Employment prospects for Heavy Equipment graduates are favorable upon completion of the program(s) – 100% strongly agreed.
- Physical facilities are sufficient to support quality instruction – 100% strongly agreed.
- Instructional equipment used us current and representative of what graduates will use on the job – 28% strongly agreed.
- Classes are reviewed and revised to keep current with the changing job practices and technology – 100% strongly agreed.
- There is a need to incorporate Global Positioning Control Systems (GPS) into the curriculum – 43% strongly agreed.
- The Advisory Board is adequately used by the program – 86% strongly agreed.
- Short and long term employment prospects in the heavy equipment industry remain strong – 100% strongly agreed.
- Suggestions from the Advisory Board are encouraged and adopted by the program – 100% strongly agreed.
- As an Advisory Board member, are you satisfied with the support Ferris State University is providing to the program – 57% indicated "No!"

Ferris State University
Heavy Equipment Technology Advisory Board Survey

General Directions: Please complete **ALL** responses that apply by filling in the corresponding answer on the answer sheet. When asked for comments, please record your answers directly on the survey sheet. Your frank response is very important for the improvement and continued success of the Heavy Equipment Program.

1. The Heavy Equipment Technology program provides students with practical skills and knowledge experiences.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

2. The Heavy Equipment Technology program Advisory Board meets often enough.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

3. The communication/advising link between FSU's Heavy Equipment program and its Advisory Board is adequate?

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

4. The Heavy Equipment degree programs (AAS & BS) are periodically reviewed and revised to keep current with changing job practices and technology.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

5. As a member of the Board, you are knowledgeable about the Heavy Equipment degree programs.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

6. Employment prospects for Heavy Equipment program graduates are favorable upon completion of the program(s).

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

7. The physical facilities are sufficient to support quality instruction.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

8. Instructional equipment used is current and representative of what graduates will use on the job.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

9. Classes are reviewed and revised to keep current with the changing job practices and technology.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

10. Is there a need to incorporate GPS Control Systems into the program?

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

11. Are there any other applications of new technology that we should look at for future consideration in the program(s)?

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

12. The Advisory Board is adequately utilized by the program.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

13. Short and long term employment prospects in the industry remain strong.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

14. Suggestions from the Advisory Board members are encouraged and adopted by the program.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

_____

_____

_____

15. As an Advisory Board member, are you satisfied with the support that Ferris State University is providing to the program?

- ☐ 1-Yes
- ☐ 2-No

Comments: _____

_____

_____

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_____

_____

16. What are the major strengths of the programs?

AAS_____

_____

BS_____

_____

_____

17. What are your suggestions for improvement of the degree programs?

AAS degree_____

_____

_____

BS degree_____

_____

_____

18. What type of industry do you serve? **(Select the one where you do the most business volume.)**

- ☐ 1-Agriculture
- ☐ 2-Automotive
- ☐ 3-Construction
- ☐ 4-Forestry
- ☐ 5-Generator sets (stand-by power)

Go to Question 17 for more choices.

19. Continuation of Question 17.

- ☐ 1-Marine
- ☐ 2-Refrigeration
- ☐ 3-Trucking
- ☐ 4-Other_____

The following questions are related to the Electrical Power Generation Certificate that is offered in addition to the AAS degree.

20. The Electrical Power Generation option provides learning in a need area of the heavy equipment industry?

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

21. The employment prospects for Electrical Power Generation option holders are strong.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

22. The Electrical Power Generation option should be continued as a certificate option in addition to the Heavy Equipment AAS program.

- ☐ 1-Strongly agree
- ☐ 2-Agree
- ☐ 3-Disagree
- ☐ 4-Strongly disagree
- ☐ 5-Not sure or the question does not apply

Comments:_____

23. Additional comments about the Electrical Power Generation certificate option.

_____

_____

_____

HEQT Advisory Board Survey...2004 Fall

Frequencies

Prepared by: Institutional Research & Testing, 11/04

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing			
q1 Practical skills/knowledge	7	0	1.57	2.00	.535
q2 Adv. Bd. meets often enough	7	0	2.14	2.00	.690
q3 Adequate comm'n between Adv. Bd. & prog	7	0	2.00	2.00	.577
q4 Progs reviewed/revised keep current	7	0	1.57	2.00	.535
q5 Bd mem's knowledgeable about progs	7	0	1.86	2.00	.378
q6 Favorable employment prospects	7	0	1.43	1.00	.535
q7 Sufficient physical facilities	7	0	1.00	1.00	.000
q8 Current instruct'l equipment	7	0	3.29	3.00	1.254
q9 Classes reviewed/revised keep current	7	0	1.86	2.00	.378
q10 Need to incorp GPS Ctrl Syst's	7	0	3.14	3.00	1.345
q11 Other apps of new tech for future	6	1	3.50	4.00	1.761
q12 Adv. Bd. adequately used by prog	7	0	2.14	2.00	.378
q13 Strong short/long term employ prospects	7	0	1.29	1.00	.488
q14 Adv. Bd. suggestions encouraged	7	0	1.86	2.00	.378
q15 Satisfied support FSU provid'g prog	7	0	1.57	2.00	.535
q18 Industry type serve	5	2	2.40	3.00	.894
q19 Industry type serve (cont'd)	3	4	3.00	3.00	.000
q20 Elect Pwr Gen provides learn'g	7	0	2.43	2.00	1.272
q21 Elect Pwr Gen strong employ prospects	7	0	2.86	2.00	1.464
q22 Elect Pwr Gen should be cont'd	7	0	2.29	2.00	1.380

Frequency Table

q1 Practical skills/knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	3	42.9	42.9	42.9
	Agree	4	57.1	57.1	100.0
	Total	7	100.0	100.0	

q2 Adv. Bd. meets often enough

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	14.3	14.3	14.3
	Agree	4	57.1	57.1	71.4
	Disagree	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

q3 Adequate comm'n between Adv. Bd. & prog

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	14.3	14.3	14.3
	Agree	5	71.4	71.4	85.7
	Disagree	1	14.3	14.3	100.0
	Total	7	100.0	100.0	

q4 Progs reviewed/revised keep current

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	3	42.9	42.9	42.9
	Agree	4	57.1	57.1	100.0
	Total	7	100.0	100.0	

q5 Bd mem's knowledgeable about progs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	14.3	14.3	14.3
	Agree	6	85.7	85.7	100.0
	Total	7	100.0	100.0	

q6 Favorable employment prospects

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	57.1	57.1	57.1
	Agree	3	42.9	42.9	100.0
	Total	7	100.0	100.0	

q7 Sufficient physical facilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	7	100.0	100.0	100.0

q8 Current instruct'l equipment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	2	28.6	28.6	28.6
	Disagree	3	42.9	42.9	71.4
	Not sure/Not app	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

q9 Classes reviewed/revised keep current

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	14.3	14.3	14.3
	Agree	6	85.7	85.7	100.0
	Total	7	100.0	100.0	

q10 Need to incorp GPS Ctrl Syst's

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	3	42.9	42.9	42.9
	Disagree	2	28.6	28.6	71.4
	Not sure/Not app	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

q11 Other apps of new tech for future

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	14.3	16.7	16.7
	Agree	1	14.3	16.7	33.3
	Disagree	1	14.3	16.7	50.0
	Not sure/Not app	3	42.9	50.0	100.0
	Total	6	85.7	100.0	
Missing	System	1	14.3		
Total		7	100.0		

q12 Adv. Bd. adequately used by prog

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	6	85.7	85.7	85.7
	Disagree	1	14.3	14.3	100.0
	Total	7	100.0	100.0	

q13 Strong short/long term employ prospects

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	71.4	71.4	71.4
	Agree	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

q14 Adv. Bd. suggestions encouraged

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	14.3	14.3	14.3
	Agree	6	85.7	85.7	100.0
	Total	7	100.0	100.0	

q15 Satisfied support FSU provid'g prog

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	42.9	42.9	42.9
	No	4	57.1	57.1	100.0
	Total	7	100.0	100.0	

q18 Industry type serve

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture	1	14.3	20.0	20.0
	Automotive	1	14.3	20.0	40.0
	Construction	3	42.9	60.0	100.0
	Total	5	71.4	100.0	
Missing	System	2	28.6		
Total		7	100.0		

q19 Industry type serve (cont'd)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Trucking	3	42.9	100.0	100.0
Missing	System	4	57.1		
Total		7	100.0		

q20 Elect Pwr Gen provides learn'g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	14.3	14.3	14.3
	Agree	4	57.1	57.1	71.4
	Disagree	1	14.3	14.3	85.7
	Not sure/Not app	1	14.3	14.3	100.0
	Total	7	100.0	100.0	

q21 Elect Pwr Gen strong employ prospects

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	5	71.4	71.4	71.4
	Not sure/Not app	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

q22 Elect Pwr Gen should be cont'd

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	2	28.6	28.6	28.6
	Agree	3	42.9	42.9	71.4
	Disagree	1	14.3	14.3	85.7
	Not sure/Not app	1	14.3	14.3	100.0
	Total	7	100.0	100.0	

Section 07. Labor Market Demands

a) U.S. Department of Labor – Heavy Vehicle and Mobile Equipment Service Technicians and Mechanics

b) *Fleet Owner* magazine – Technician Shortage Looms

c) *Construction Equipment Distribution* magazine – Invest in the Future: Support Workforce Development

d) *Construction Equipment Distribution* magazine – Assess the Need: The Search for Technicians Begins Anew

e) Survey results – AED members in the United States

Survey results – AED Members Across the United States

Occupation	Employed 2001	Grow from 2000-2010 %	Need
Heavy Equipment Service Technicians	116,260	9	10,463
Bus & Truck Service Technicians	254,420	15	38,188
Farm Equipment Service Technicians	35,420	15	5,313
Aircraft Service Technicians	135,250	16	21,640
Outdoor Power Equipment Technicians	27,250	9	2,452
Other Small Engine Technicians	39,000	9	3,510
Railcar Technicians	14,000	9	1,260

Occupation	2004 Need
Heavy Equipment Service Technicians	3,775
Bus & Truck Service Technicians	4,243
Farm Equipment Service Technicians	590
Aircraft Service Technicians	2,404
Outdoor Power Equipment Technicians	390
Total Annual Need	11,402

Total number of technicians graduating from post-secondary Heavy Equipment Technology programs in 2004 will be 3,750 leaving a gap of qualified technicians of 7,652.

Heavy Vehicle and Mobile Equipment Service Technicians and Mechanics

(0*NET 49-3041.00, 49-3042.00, 49-3043.00)

Significant Points

- Opportunities should be good for persons with formal postsecondary training in diesel or heavy equipment mechanics, especially if they also have training in basic electronics and hydraulics.
- This occupation offers relatively high wages and the challenge of skilled repair work.
- Skill in using computerized diagnostic equipment is becoming more important.

Nature of the Work

Heavy vehicles and mobile equipment are indispensable to many industrial activities, from construction to railroads. Various types of equipment move materials, till land, lift beams, and dig earth to pave the way for development and production. *Heavy vehicle and mobile equipment service technicians and mechanics* repair and maintain engines and hydraulic, transmission, and electrical systems powering farm equipment, cranes, bulldozers, and railcars. (For more detailed information on service technicians specializing in diesel engines, see the statement on diesel service technicians and mechanics elsewhere in the *Handbook.*)

Service technicians perform routine maintenance checks on diesel engines and on fuel, brake, and transmission systems to ensure peak performance, safety, and longevity of the equipment. Maintenance checks and comments from equipment operators usually alert technicians to problems. With many types of modern heavy and mobile equipment, technicians can plug hand-held diagnostic computers into onboard computers to diagnose any component needing adjustment or repair. After locating the problem, these technicians rely on their training and experience to use the best possible technique to solve the problem. If necessary, they may partially dismantle the component to examine parts for damage or excessive wear. Then, using hand-held tools, they repair, replace, clean, and lubricate parts as necessary. In some cases, technicians calibrate systems by typing codes into the onboard computer. After reassembling the component and testing it for safety, they put it back into the equipment and return the equipment to the field.

Many types of heavy and mobile equipment use hydraulics, to raise and lower movable parts. When hydraulic components malfunction, technicians examine them for fluid leaks, ruptured hoses, or worn gaskets on fluid reservoirs. Occasionally, the equipment requires extensive repairs, as when a defective hydraulic pump is replaced.

In addition to conducting routine maintenance checks, service technicians perform a variety of other repairs. They diagnose electrical problems and adjust or replace defective components. They also disassemble and repair undercarriages and track assemblies. Occasionally, technicians weld broken equipment frames and structural parts, using electric or gas welders.

It is common for technicians in large shops to specialize in one or two types of repair. For example, a shop may have individual specialists in major engine repair, transmission work, electrical systems, and suspension or brake systems. The technology used in heavy equipment is becoming more sophisticated with the increased use of electronic and computer-controlled components. Training in electronics is essential for these technicians to make engine adjustments and diagnose problems. Training in the use of hand-held computers also is necessary, because computers help technicians diagnose problems and adjust the functions of components.

Service technicians use a variety of tools in their work: power tools, such as pneumatic wrenches, to remove bolts quickly; machine tools, like lathes and grinding machines, to rebuild brakes; welding and flame-cutting equipment, to remove and repair exhaust systems; and jacks and hoists, to lift and move large parts. Service technicians also use common handtools—screwdrivers, pliers, and wrenches—to work on small parts and to get at hard-to-reach places. They may use a variety of computerized testing equipment to pinpoint and analyze malfunctions in electrical systems and other essential systems. For example, tachometers and dynamometers serve to locate engine malfunctions. Service technicians also use ohmmeters, ammeters, and voltmeters when working on electrical systems.

Mobile heavy equipment mechanics and service technicians keep construction and surface mining equipment, such as bulldozers, cranes, crawlers, draglines, graders, excavators, and other equipment, in working order. Typically, these workers are employed by equipment wholesale distribution and leasing firms, large construction and mining companies, local and Federal governments, and other organizations operating and maintaining heavy machinery and equipment fleets. Service technicians employed by the Federal Government may work on tanks and other armored equipment.

Farm equipment mechanics service, maintain, and repair farm equipment, as well as smaller lawn and garden tractors sold to suburban homeowners. What typically was a general repairer's job around the farm has evolved into a specialized technical career. Farmers have increasingly turned to farm equipment dealers to service and repair their equipment because the machinery has grown in complexity. Modern equipment uses more electronics and hydraulics, making it difficult to perform repairs without some specialized training.

Farm equipment mechanics work mostly on equipment brought into the shop for repair and adjustment. During planting and harvesting seasons, they may travel to farms to make emergency repairs to minimize delays in farm operations.

Railcar repairers specialize in servicing railroad locomotives and other rolling stock, streetcars and subway cars, or mine cars. Most work for railroads, public and private transit companies, and railcar manufacturers.

With many types of modern heavy and mobile equipment, technicians can plug hand-held diagnostic computers into onboard computers to diagnose components needing adjustment or repair.

Working Conditions

Service technicians usually work indoors, although many make repairs at the worksite. To repair vehicles and equipment, technicians often lift heavy parts and tools, handle greasy and dirty parts, and stand or lie in awkward positions. Minor cuts, burns, and bruises are common; serious accidents normally are avoided when the shop is kept clean and orderly and when safety practices are observed. Technicians usually work in well-lighted, heated, and ventilated areas. However, some shops are drafty and noisy. Many employers provide uniforms, locker rooms, and shower facilities.

When heavy or mobile equipment breaks down at a construction site, it may be too difficult or expensive to bring it into a repair shop, so the shop often sends a field service technician to the site to make repairs. Field service technicians work outdoors and spend much of their time away from the shop. Generally, the more experienced service technicians specialize in field service. They usually drive trucks specially equipped with replacement parts and tools. On occasion, they must travel many miles to reach disabled machinery. Field technicians normally earn a higher wage than their counterparts, because they are required to make on-the-spot decisions that are necessary to serve their customers.

The hours of work for farm equipment mechanics vary according to the season of the year. During the busy planting and harvesting seasons, mechanics often work 6 or 7 days a week, 10 to 12 hours daily. In slow winter months, however, mechanics may work fewer than 40 hours a week.

Employment

Heavy vehicle and mobile equipment service technicians and mechanics held about 176,000 jobs in 2002. Approximately 126,000 were mobile heavy equipment mechanics, 35,000 were farm equipment mechanics, and 15,000 were railcar repairers. About a third were employed by machinery, equipment, and supplies merchant wholesalers. More than 12 percent were employed by Federal, State, and local governments, and another 12 percent worked in construction, primarily for specialty trade contractors and highway, street, and bridge construction companies. Other service technicians worked in agriculture; mining; rail transportation and support activities; and commercial and industrial machinery and equipment rental, leasing, and repair. A small number repaired equipment for machinery and railroad rolling stock manufacturers or lawn and garden equipment and supplies stores. Less than 5 percent of service technicians were self-employed.

Nearly every section of the country employs heavy and mobile equipment service technicians and mechanics, although most work in towns and cities where equipment dealers, equipment rental and leasing companies, and construction companies have repair facilities.

Training, Other Qualifications, and Advancement

Many persons qualify for service technician jobs through years of on-the-job training, but most employers prefer that applicants complete a formal diesel or heavy equipment mechanic training program after graduating from high school. They seek persons with mechanical aptitude who are knowledgeable about the fundamentals of diesel engines, transmissions, electrical systems, and hydraulics. In addition, the constant change in equipment technology makes it necessary for technicians to be flexible and have the capacity to learn new skills quickly.

Many community colleges and vocational schools offer programs in diesel technology. Some tailor programs to heavy equipment mechanics. These programs educate the student in the basics of analytical and diagnostic techniques, electronics, and hydraulics. The increased use of electronics and computers makes training in the fundamentals of electronics essential for new heavy and mobile equipment mechanics. Some 1- to 2-year programs lead to a certificate of completion, whereas others lead to an associate degree in diesel or heavy equipment mechanics. These programs not only provide a foundation in the components of diesel and heavy equipment technology, but also enable trainee technicians to advance more rapidly to the journey, or experienced worker, level.

A combination of formal and on-the-job training prepares trainee technicians with the knowledge to service and repair equipment handled by a shop. After a few months' experience, most beginners perform routine service tasks and make minor repairs. As they prove their ability and competence, they advance to harder jobs. After trainees master the repair and service of diesel engines, they learn to work on related components, such as brakes, transmissions, and electrical systems. Generally, a service technician with at least 3 to 4 years of on-the-job experience is accepted as fully qualified.

Many employers send trainee technicians to training sessions conducted by heavy equipment manufacturers. The sessions, which typically last up to 1 week, provide intensive instruction in the repair of the manufacturer's equipment. Some sessions focus on particular components found in the equipment, such as diesel engines, transmissions, axles, and electrical systems. Other sessions focus on particular types of equipment, such as crawler-loaders and crawler-dozers. As they progress, trainees may periodically attend additional training sessions. When appropriate, experienced technicians attend training sessions to gain familiarity with new technology or equipment.

High school courses in automobile repair, physics, chemistry, and mathematics provide a strong foundation for a career as a service technician or mechanic. It is also essential for technicians to be able to read and interpret service manuals in order to keep abreast of engineering changes. Experience working on diesel engines and heavy equipment acquired in the Armed Forces is valuable as well.

Voluntary certification by the National Institute for Automotive Service Excellence is recognized as the standard of achievement for heavy vehicle and mobile equipment service technicians, who may be certified as a master heavy-duty diesel technician or in a specific area of heavy-duty equipment repair, such as brakes, gasoline engines, diesel engines, drivetrains, electrical systems, or suspension and steering. For certification in each area, technicians must pass a written examination and have at least 2 years' experience. High school, vocational or trade school, or community or junior college training in gasoline or diesel engine repair may substitute for up to 1 year's experience. To remain certified, technicians must be retested every 5 years. Retesting ensures that service technicians keep up with changing technology. However, there are currently no certification programs for other heavy vehicle and mobile equipment repair specialties.

The most important work possessions of technicians are their handtools. Service technicians typically buy their own handtools, and many experienced technicians have thousands of dollars invested in them. Employers typically furnish expensive power tools, computerized engine analyzers, and other diagnostic equipment, but handtools are normally accumulated with experience.

Experienced technicians may advance to field service jobs, wherein they have a greater opportunity to tackle problems independently and earn additional pay. Technicians with leadership ability may become shop supervisors or service managers. Some technicians open their own repair shops or invest in a franchise.

Job Outlook

Opportunities for heavy vehicle and mobile equipment service technicians and mechanics should be good for those who have com-

pleted formal training programs in diesel or heavy equipment mechanics. Persons without formal training are expected to encounter growing difficulty entering these jobs.

Employment of heavy vehicle and mobile equipment service technicians and mechanics is expected to grow slower than the average for all occupations through the year 2012. Most job openings will arise from the need to replace experienced repairers who retire. Employers report difficulty finding candidates with formal postsecondary training to fill available service technician positions, because many young people with mechanic training and experience opt to take jobs as automotive service technicians, diesel service technicians, or industrial machinery repairers—jobs that offer more openings and a wider variety of locations in which to work.

Faster employment growth is expected for mobile heavy equipment mechanics than for farm equipment mechanics or railcar repairers. Increasing numbers of heavy duty and mobile equipment service technicians will be required to support growth in the construction industry, equipment dealers, and rental and leasing companies. Because of the nature of construction activity, demand for service technicians follows the Nation's economic cycle. As the economy expands, construction activity increases, resulting in the use of more mobile heavy equipment to grade construction sites, excavate basements, and lay water and sewer lines. The increased use of such equipment increases the need for periodic service and repair. In addition, the construction and repair of highways and bridges requires more technicians to service equipment. As equipment becomes more complicated, repairs increasingly must be made by specially trained technicians. Job openings for farm equipment mechanics and railcar repairers are expected to arise mostly because of replacement needs.

Construction and mining are particularly sensitive to changes in the level of economic activity; therefore, heavy and mobile equipment may be idled during downturns. In addition, winter is traditionally the slow season for construction and farming activity, particularly in cold regions. Few technicians may be needed during periods when equipment is used less; however, employers usually try to retain experienced workers. Employers may be reluctant to hire inexperienced workers during slow periods.

Earnings

Median hourly earnings of mobile heavy equipment mechanics were $17.29 in 2002. The middle 50 percent earned between $14.13 and $20.88. The lowest 10 percent earned less than $11.54, and the highest 10 percent earned more than $24.90. Median hourly earnings in the industries employing the largest numbers of mobile heavy equipment mechanics in 2002 were as follows:

Federal Government	$19.44
Local government	18.03
Other specialty trade contractors	17.72
Machinery, equipment, and supplies merchant wholesalers	17.10
Commercial and industrial machinery and equipment rental and leasing	15.81

Median hourly earnings of farm equipment mechanics were $13.03 in 2002. The middle 50 percent earned between $10.50 and $16.01. The lowest 10 percent earned less than $8.73, and the highest 10 percent earned more than $18.86.

Median hourly earnings of railcar repairers were $18.78 in 2002. The middle 50 percent earned between $15.65 and $21.18. The lowest 10 percent earned less than $12.07, and the highest 10 percent earned more than $23.76. In 2002, median hourly earnings were $19.72 in rail transportation, the industry employing the largest number of railcar repairers.

Many heavy vehicle and mobile equipment service technicians and mechanics are members of unions, including the International Association of Machinists and Aerospace Workers, the International Union of Operating Engineers, and the International Brotherhood of Teamsters.

Related Occupations

Workers in related repair occupations include aircraft and avionics equipment mechanics and service technicians; automotive service technicians and mechanics; diesel service technicians and mechanics; heating, air-conditioning, and refrigeration mechanics and installers; and small engine mechanics.

Sources of Additional Information

More details about job openings for heavy vehicle and mobile equipment service technicians and mechanics may be obtained from local heavy and mobile equipment dealers and distributors, construction contractors, and government agencies. Local offices of the State employment service also may have information on job openings and training programs.

For general information about a career as a heavy vehicle and mobile equipment service technician or mechanic, contact:

➤ The Equipment Maintenance Counsel, P.O. Box 1368, Glenwood Springs, CO 81602. Internet: **http://www.equipment.org**

➤ The AED Foundation (Associated Equipment Dealers affiliate), 615 W. 22nd St., Oak Brook, IL 60523. Internet: **http://www.aednet.org/aed_foundation**

For a directory of public training programs in heavy and mobile equipment mechanics, contact:

➤ SkillsUSA-VICA, P.O. Box 3000, Leesburg, VA 20177-0300. Internet: **http://www.skillsusa.org**

A list of certified diesel service technician training programs can be obtained from:

➤ National Automotive Technician Education Foundation (NATEF), 101 Blue Seal Dr., Suite 101, Leesburg, VA 20175. Internet: **http://www.natef.org**

Information on certification as a heavy-duty diesel service technician is available from:

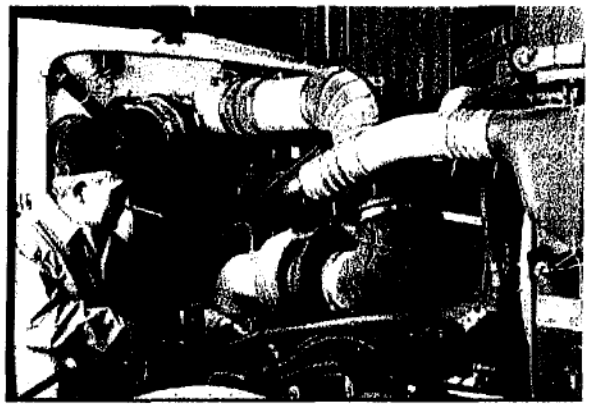
➤ National Institute for Automotive Service Excellence (ASE), 101 Blue Seal Dr. SE., Suite 101, Leesburg, VA 20175. Internet: **http://www.asecert.org**

EMAIL THIS ARTICLE

Technician Shortage Looms

by Sean Kilcarr, senior editor

Oct 11, 2004 1:24 PM



As the trucking industry copes with high fuel prices, rising insurance costs, and an ever-increasing shortage of drivers, there's another potential problem looming in the near future: how to find qualified mechanics to staff their truck repair facilities.

JOST
International Corp.

According to the Bureau of Labor Statistics, by 2012, the automotive and heavy truck repair sector is expected to face a shortage of 107,000 personnel. This is largely because the hiring of young people into this field is lagging far behind the large numbers of mechanics that are retiring or will begin retiring over the next decade.

"Truck mechanics represent an aging workforce and we're not attracting anywhere near the same number of new hires to replace the ones that will retire," Chuck Roberts, executive director-industry relations for the National Institute for Automotive Service Excellence (ASE), told *Fleet Owner.*

While it's difficult to point to any one reason for the shortage of "new faces," he noted that several conditions are interacting together that may reducing the available labor pool for the automotive and truck technician field alike.

The main one is that the "image" of the truck and automotive technician is still stereotyped to a large degree – a job representing "tough, greasy, dirty work" as opposed to the much more sophisticated computer-based environment it is today, he said.

"The job is much, much different than it was 15 or even 10 years ago," Roberts explained. "Today, the computer skills required to be a truck technician actually match the skill sets the labor face has today – yet they are choosing to go into computer repair, for example, rather that truck repair based on outdated images."

Roberts believes the industry will have to start the recruiting process at a much younger age – even the elementary school level as opposed to the high school environment.

"It's going to take a grass-roots level effort to recruit new hires for these jobs, and it's an effort that's going to have to get underway sooner rather than later," he said.

"At all levels in this industry, trucks continue to get more sophisticated," said Reed Murphy, president of Kansas City-based MHC Leasing, in an interview with *FleetOwner.* "That increases the difficulty in both recruiting and training mechanics. We as an industry are facing that."

Ric Hiller, chief of Arlington County, VA's equipment division – charged with keeping the county's fleet of 1,500 units up and running – is one fleet manager trying to come to grips with that issue.

"I've doubled my training budget to try and keep our guys current with all the technological changes going on in trucks and heavy equipment today – especially in terms of their electrical and computer systems," he told *Fleet Owner.*

"On top of that, it's getting harder and harder to find qualified technicians today because the job has become so computerized," Hiller explained. "So we're talking to the local school system to see if we can't find a way to 'grow' our own technicians from the local community, getting vocational students into part time jobs while they go to school so can recruit them full time when they graduate."

Invest in the Future:
Support Workforce Development

"It is imperative that dealers and manufacturers participate in The AED Foundation programs because they are unparalleled in our industry's history." – Earl K. Harbaugh

By Mary Seaman
Associate Editor

The AED Foundation works to enhance the success of AED member companies by encouraging continuous learning, providing educational opportunities for today's employees and improving the quality of employees available in the future. The Foundation works to increase recruitment of entry-level technicians into the equipment industry and is recognized in the educational community as an authority on construction equipment industry careers.

Recruiting on-line

By making resources available to teachers and construction equipment career information accessible to students, the Foundation encourages high school students to attend programs that prepare them for careers in the industry.

At the Foundation's *ConstructMyFuture.com* website, students can receive information on scholarships for construction related programs. Each year, more than 100,000 parents, teachers, students and counselors access the site.

A new feature of the website launched in March will make the AED member's search for technicians easier. Dealers can locate entry-level technicians on-line at *www.aedworkforce.com.*

Dealers that invest in the Foundation – roughly the equivalent of one billable hour for each technician they employ – will be able to screen graduates of heavy equipment and diesel technology programs on-line.

Accredited Schools

The AED Foundation has accredited programs in the following schools.

- Alaska Vocational Technical Center
- Central Lakes College (Minnesota)
- Ferris State University (Michigan)
- Illinois Central College
- Lewis-Clark State College (Idaho)
- Linn State Technical College (Missouri)
- North Dakota State College of Science.
- Parkland College (Illinois)

These schools are awaiting accreditation:

- Central Arizona College
- Florence Darlington Technical College (South Carolina)
- Idaho State University
- North Dakota State College
- Owens State Community College (Ohio)
- Pennsylvania College of Technology
- Reedley College (California)
- San Joaquin Delta College (California)
- South Georgia Technical College
- Southeast Community College
- Southwest Georgia Technical School
- Suny Cobleskil (New York)
- Texas State Technical College
- Vermont Technical College
- Wake Technical College (North Carolina)

Students who have completed technical school or technical programs can apply for jobs on-line and post their employment profiles for AED member companies to review.

Using the site, AED member dealers can pre-screen technicians. Candidate Resources provides an aptitude test that entry-level technicians can take when applying for positions.

Through an AED program with Candidate Resources, AED member dealers can see the assessment results before requesting an interview, saving time and money.

School accreditation

The AED Foundation is accrediting college programs to verify that they meet or exceed industry standards.

Accreditation identifies quality programs from which dealers can recruit new employees. It also helps the school qualify for state and federal funding.

"We must continue to work closely with our local technical programs," says Whit Perryman, president of Vermeer Equipment of Texas. "I'm aware of the difficulties these schools have getting students. It's our job to work with these schools, and thanks to the Foundation's projects we have more resources to share with students and teachers about our industry as a whole."

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Issue Brief—Local Initiatives

The AED Foundation's High School Program

This narrative discusses a local effort to create an effective, ongoing business/education partnership for developing a group of secondary school students for participation in a world class, 21st century American workforce. See the companion document for information on national initiatives, and on how this particular local one has potential as a national model. These documents touch major highlights and do not attempt to present all the details. Please note that the background points below apply to both of the briefs submitted by The AED Foundation.

Background of a Major Industry Problem:

The construction equipment industry faces a tremendous shortage of people to repair and maintain the machines and equipment used in a $67 billion dollar business in the United States alone. Thousands of machines--gasoline, diesel and/or electrically--powered are used to build roads and bridges, commercial, industrial and public buildings, homes, pipelines and power lines, environmental projects and much more. The equipment range from gigantic bulldozers and cranes to small drills and compressors.

Ask any one of the nearly 1,000 independent construction equipment dealers in the United States if the company has enough technicians. The answer is probably "no." In fact, The AED Foundation estimates that there are at least 25,000 such jobs available in the next five years. Here are a few of the reasons why this shortage exists:

- Construction and its related industries are seen as mature and traditional industries that do not have the pizzazz of computer or internet businesses.
- Traditional primary and secondary school math and science programs hold most students to low standards and are generally not up-to-date with current technology.
- Technicians normally don't require four-year degrees; careers not requiring them are rarely discussed in American high schools or are treated as second class jobs. (Ironically, in Europe students in the so called "trades" are highly respected.)

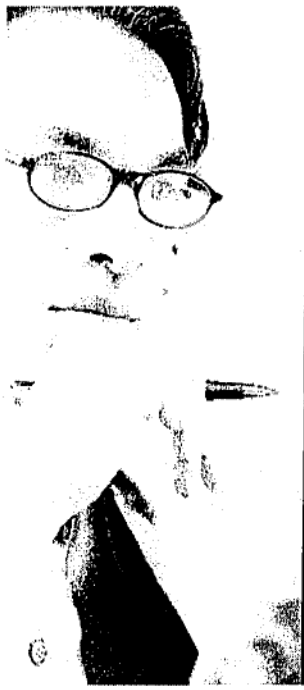
- Students have a poor image of the construction equipment industry because it is associated with the dirt, grime and grease usually seen on machinery. Female students see equipment technology as a traditionally male dominated industry with few opportunities for them. Parents steer children away from "blue collar" careers even though studies show that only 30% of the jobs in the 21st Century will require four-year degrees.
- The construction equipment industry has not done enough to build relationships with schools in order to recruit the technical talent it needs.
- Similar industries with the same shortage problem have been slow to recognize the benefits of working together. Actually, thousands more technicians are needed in related industries such as auto, trucking, agriculture, material handling and outdoor power.

Plans To Address and Solve It

The AED Foundation is the educational arm of Associated Equipment Distributors (AED), an international association that represents more than 1,200 construction equipment distributors, manufacturers and supplier firms in The U. S., Canada and abroad.

Through its Technical Training and Careers Committees, the foundation is working to address each one of the points described in the background above. See the companion document for specifics on the whole plan to face and overcome the current shortage of technical people.

Here we present a description of one potential solution, the creation of an Equipment & Technology Institute (ETI) at an inner city Chicago high school.



The AED Foundation provides access to extensive resources that enable dealers to more efficiently recruit students.

Resources

The AED Foundation provides access to extensive resources that enable dealers to more efficiently recruit students. Materials on the AEDCreative Connections website are updated regularly and include reports on dealers and school needs. The site links dealers to 257 schools that have heavy equipment/diesel and related training programs.

Recruitment materials for dealers have been developed and compiled by The AED Foundation. Most are available on-line at no fee. Some materials such as posters, videos, DVDs and brochures are available at a nominal cost. The Foundation also provides a recruitment brochure on careers in the construction industry, designed specifically for use by dealers when recruiting locally.

Professional education

The AED Foundation provides continuing education for managers through The AED University. Self-study programs and seminars allow participants to improve their skills. Program topics include Parts & Service Management, Financial Management, Branch Management Excellence, and Managing the Sales Professional.

Another AED University program held at AED's annual meeting each year offers three days of training for parts managers, rental managers, sales managers and service managers.

Preparing for the future

Now is the time to prepare for the future. Consider partnering with The AED Foundation by providing financial support to allow the Foundation to continue working to recruit and train tomorrow's workforce.

"We do all of these things on behalf of our members as a benefit for their participation," says Carol Schrader, Director of Development for the Foundation. "Their contributions and their investments make it possible."

"It is imperative that dealers and manufacturers participate in AED Foundation programs because they are unparalleled in our industry's history," says Earl K. Harbaugh, president, Ditch Witch Midwest. "Industry leaders have an ongoing responsibility to enable The AED Foundation's creation of dynamic education and workforce development programs for the future."

The AED Foundation's Accomplishments

Following are highlights of a few of The AED Foundation's accomplishments:

- Published industry technical standards distributed to 257 heavy equipment and related school programs.
- Awarded scholarships through Construct My Future partnership.
- Responded to 66,600 inquiries for career information in 2003.
- Researched trends in technician availability and the condition of equipment technology programs nationwide.
- Designed independent study programs for branch managers, parts managers and service managers.
- Hosted seminars on sales, parts, service, branch and rental management.
- Represented the construction equipment industry in front of the U.S. House Committee on Small Business regarding the need for funding of technical training.
- Awarded: 1999 Employment Management Association Foundation School/Business Partnership Award; 2001 National Bellwether Award; 2002 Illinois State Board of Education Exemplary Partnership Award; 2002 ASAE Award of Excellence.

Assess the Need:
The Search for Technicians Begins Anew

Dealers responding to a recent AED survey employ an average of 48 technicians and have 3.7 current openings for technicians

By Pam Gruebnau
Publisher/Editorial Director

As the construction equipment industry recovers and equipment sales climb, dealers are forecasting service sales growth. With both, comes the search for new technicians and the inevitable shortages.

In March, AED surveyed member dealers to gauge the coming need for technicians. More than 90 percent of the full-service equipment dealers who responded predict an increase in service sales in 2004 – with 44.3 percent expecting the growth to reach 6 percent or more.

About 99 percent are forecasting continued service sales growth in 2005 – with 36.4 percent expecting that growth to be 6 percent or more. And in 2006, 94.3 percent expect growth to continue, although only 27.3 percent are prepared to forecast growth of 6 percent or more. Not one dealer responding to the survey is forecasting a decrease in service sales in 2004, 2005 or 2006.

The technician shortage

For most dealers an increase in service sales will require hiring new technicians. Dealers responding to the recent survey employ 4,170 technicians, or 48 technicians per firm.

Perhaps more important, those same dealers report 242 technician positions open currently, or an average of 3.7 technicians per dealer. Nearly 16 percent of dealers are reporting five or more technician positions open, and one dealer needs 22 technicians.

Projecting those ratios across the 900 independent authorized full-service construction equipment dealers in the United States, the industry employs 43,200 technicians and has a current demand for 3,330 more.

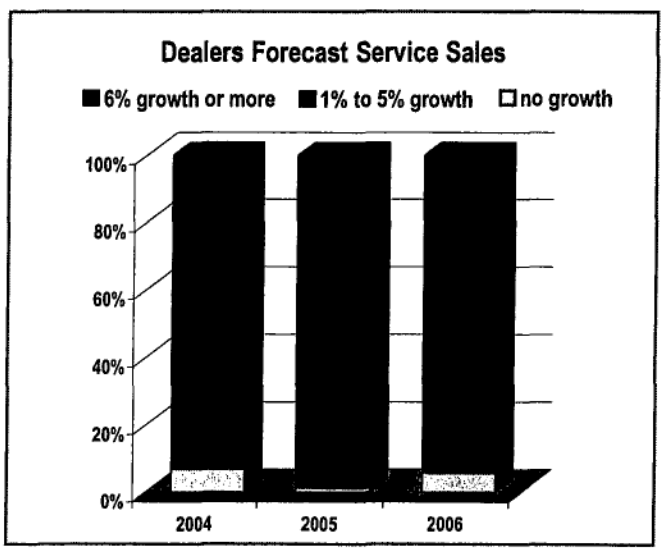
The cost

Billable hours for technicians are like inventory on the shelf, but you can't bill what you don't have. Looking at the current shortage in terms of potential revenue:

1 technician at 80% efficiency (recovery rate)
X 45.6 hours/week =
36.5 billable hours

36.5 billable hours
X $70 average retail shop rate =
$2,550 billable per week

Multiply that $2,550 by the 3.7 technicians the average dealer needs to hire, and that's $9,453 in service revenue lost weekly per dealership.



Not one dealer responding to a recent AED survey is forecasting a decrease in service sales in 2004, 2005 or 2006.

The search

Where will dealers find those technicians?

Although one dealer responding to the survey did report hiring all of his technicians from "Other dealers," most dealers are hiring from a variety of sources. Still, dealers are more likely to hire new technicians (75.0 percent) from other construction equipment dealers than from any other source. They also look for new technicians in "Other Industries" (55.7 percent), such as automotive.

About 56 percent are hiring technicians from vocational and technical schools, and slightly more than one-third hire from the military. Most

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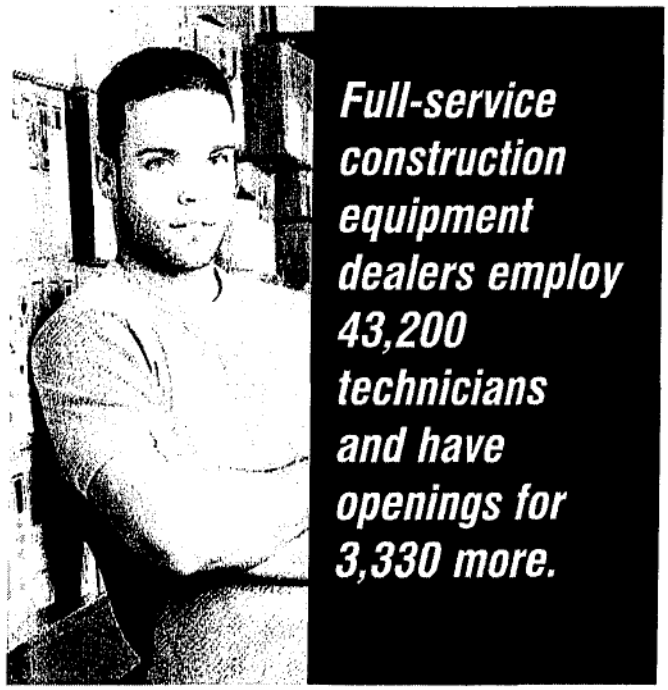


of the 22.7 percent who said they hire from "Other" specified that by other they meant contractors.

Dealers say they'll continue their search for technicians using:

- Advertising (40 percent)
- High schools, vocational schools and/or community colleges (33 percent)
- Word of mouth or referrals (28 percent)
- The website (11 percent)
- Finder's fees or signing bonuses (5 percent)
- Offers of better benefits and/or better salary (3 percent)
- The military (3 percent).

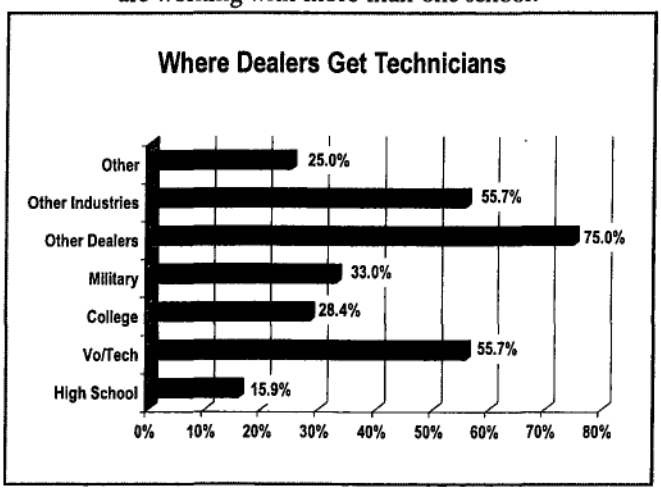
"We recently put magnetic signs on our service trucks advertising for mechanics," wrote one dealer. While another admits to "recruiting from the competition by offering benefits, good salary, secure working conditions and factory training."

Another respondent wrote: "We have even considered going outside the United States [for technicians]. We are open for any new recruiting tricks to hire technicians."

Workforce development

With the need for technicians greater than the supply, 64.8 percent of dealers responding to the survey are involved in workforce development, either to promote the value of a career in the construction equipment industry or to improve the quality of technicians graduating from various institutions.

Three out of four of them are working with vocational/technical schools, 54.4 percent work with colleges, and just over 28 percent work with high schools. About 45 percent of the dealers are working with more than one school.



Three out of four dealers shop for new technicians at other dealers; 25 percent get them from contractors.

That involvement is most likely to be supplying paid internships (38.6 percent), working with or on the school board (29.5 percent), taking part in career fairs (26.1 percent) and donating equipment (25.0 percent).

About half (51.6 percent) of the dealers who are not now working with schools, say they would be willing to start.

More than 75 percent of the dealers who are working with schools in some capacity have hired technicians as a result of that involvement. The range of technicians hired is one to 40 with an average of 6.5.

Defining entry-level

Based on the survey, dealers are paying entry-level technicians an average of $13.91 hourly, with a minimum of $9.50 and a maximum of $27. Technicians average a 46-hour work week in the summer and a 41-hour week in the winter.

Asked to evaluate the training entry-level technicians have received, 61 percent of dealers have found technicians have the most training in "engines."

However, dealers report technicians are least prepared in "electronics" (59.0 percent) and "hydraulics" (29.5 percent).

Section 08. Evaluation of Facilities and Equipment

a) Describe current facilities

b) Discuss adequacy of facilities to meet program goals

c) Describe future needs of the department

a) Describe Current Facilities

The Heavy Equipment Technology Center has 57,000 square feet of floor space, 37,000 square feet is available for instructional purposes. The instructional space is composed of combined lecture/labs, auditorium and a service floor area. The service floor area accounts for 10,000 square feet of the 37,000 square feet. Even though the facility is of excellent design for teaching heavy equipment programs, it was designed to accommodate pre-1975 heavy equipment vehicles and instructional units. Today's heavy equipment vehicles incorporate more electronics and computers in the control of electrical, fuel, power train and hydraulic systems. This additional technology requires more instructional space that was required in previous years.
All lecture/labs can accommodate a maximum of one piece of mobile equipment for demonstration. When lecture/labs are used by more than one instructor, which is usually the case, there is not enough lab space in the rooms to accommodate all the necessary instructional equipment. Mainly for this reason, curriculum revisions were proposed and implemented in 2001 to offer summer internships (HEQT-193 & HSET- 393) in place of the Heavy Equipment Lab Practice course.

b) Discuss Adequacy of Facilities to Meet Program Goals

The Heavy Equipment Technology Center has between thirty-five and forty heavy equipment vehicles which are used for demonstration and lab exercises. About twenty-five pieces of the equipment are used continually in a variety of courses. The overall condition of the equipment is acceptable. Over the past five years HET has received over $500,000 in donated equipment and instructional units. The challenge is to continue to acquire equipment and instructional units to address the new and evolving technology.

c) Describe Future Needs of the Department

Acquire new and additional equipment and instructional units to address the new and evolving technology. We especially need more updated construction and agricultural equipment and instructional units. We also need to a better job of advertising our electrical power generation certificate program.

Section 09. Curriculum Review

a) Program check sheets

b) Curricular changes

c) Curriculum and program goals

d) Students acquiring necessary and appropriate knowledge and skills

e) Composition of the Heavy Equipment faculty

f) Discuss the impact of adjunct and term faculty on the program

g) Describe the impact of service courses

h) Provide information with respect to the educational strategies used by the Heavy Equipment Department's faculty

b) Curricular changes

The Heavy Equipment Department has initiated and implemented two curriculum revision proposals since the last academic program review. Curriculum revisions were made to the two-year A.A.S. degree in Heavy Equipment Technology and the four-year BS degree in Heavy Equipment Service Engineering Technology degree programs. Final revisions will be implemented in the Winter 2005 semester.

Two-year Associate Degree Revisions

Replaced an eight credit hour lab practice course with a four credit hour summer internship along with moving the automatic transmission course from the four-year into the two-year program.

The changes were made for the following reasons:

- Increase the hands-on hours and quality of technical experience of our graduates
- Improve/increase program contacts with industry
- Improve productive use of the service floor area
- Reduce faculty overloads
- Increase faculty productivity
- Increase tuition dollar income for the University

Four-year Bachelor Degree Revisions

Merge the two curriculum options, replace required courses with directed elective options and replace HSET-401 Interfacing Systems Analysis with HSET-410 Interactive Electronic Controls.

The changes were made for the following reasons:

- Maintain our curriculum to include new and evolving technology
- Improve/increase program contacts with industry
- Reduce faculty overloads
- Increase faculty productivity

c) Curriculum changes and program goals

Implementing the curriculum changes (Section b) helped to achieve five out of the seven department goals.

Goal 1: Merge the Maintenance and Repair and the Manufacturing options of the four-year BS degree program

Goal 2: Achieve program accreditation through the Associated Equipment Distributors Foundation (AEDF) and assist AEDF to become nationally recognized as an accrediting organization for post-secondary heavy equipment technology programs.

Goal 3: Develop and implement ideas that would market and "showcase" the Heavy Equipment Technology program and the heavy equipment industry.

Goal 4: To investigate and identify new and future technology within each industry served by the Heavy Equipment Technology program and to develop a plan for the systematic replacement of old and obsolete lab equipment, machinery and tools.

Goal 5: Develop a plan for the systematic replacement of retiring faculty and for hiring additional faculty as program enrollment increases.

Goal 6: To investigate and identify new and future technology within each industry served by the Heavy Equipment Technology program and to develop a plan to provide training for the faculty to upgrade their skills and knowledge in the areas of their specific responsibilities.

Goal 7: Acquire additional sources of income for the Heavy Equipment Department.

d) Describe how you determined that your students have acquired the necessary and appropriate knowledge and skills to begin a career or to continue their education in your field.

There is a high demand for students graduating out of both the two-year A.A.S. degree and the four-year BS degree heavy equipment programs

- 100% job placement – four to five job offers per graduate
- Graduate and advisory committee follow-up surveys
    - Ability to advance into upper level management/leadership positions
    - Transferable skills in a varied job market

The HEQT and the HSET programs are unique to the heavy equipment industry in the State of Michigan and the United States. The current HEQT program was implemented as a certificate program in 1959 and has evolved to one of the top rated programs in the country because of industry needs. Until two years ago, the HEQT program was the only one of twelve heavy equipment programs left in Michigan, today there are only two. Five years ago Ferris was ***the only*** public university to offer a two-year A.A.S. degree program in the Midwest, today there are five. The HSET program is ***the only*** four-year technical degree program of its kind.

The HEQT and HSET programs have had a very positive impact on the heavy equipment industry. For years, the industry has benefited from the quality of our graduates. Ferris' Heavy Equipment Technology programs are recognized as industry leaders. Our graduates not only work in Michigan but throughout the United States and Canada but also in Botswana, South Africa, Malaysia, India, the Caribbean Islands, Ethiopia, Morocco and Angola. The government of Botswana has made both the HEQT and the HSET programs, their number one choice for their heavy equipment students.

e) Describe the composition of the Heavy Equipment Department's faculty and their qualifications to meet the goals of the program

All faculty qualifications meet or exceed qualifications for program accreditation/certification. The faculty of the HEQT and the HSET programs has been stable in the past. In 1998 there were seven faculty members – Ken Acton, Keith Cripe, William Hillary, Bruce Jacobs, John Shaltry, and John Strohkirch. Gary Sievert was hired in 1998. In the last four years considerable change has occurred in the Department's composition due to retirements. Faculty members who retired were:

Ken Acton	Fall 2000
William Hillary, John Shaltry & Gary Sievert	Fall 2003
Bruce Jacobs	Summer 2004

Jerry Zmyslowski was hired in the fall of 2001. Gary Maike and Darren Wilson were hired in the fall of 2004. All three are full time tenure track faculty.

In 2003 adjunct faculty were used to fill the empty positions. Adjunct faculty members were Ken Anderson, David Cloud, Douglas Ginnever, Bradley Stitt, Joseph Strohkirch and Timothy Yearling.

The current faculty consists of two tenured faculty members – Keith Cripe with thirty-five years and John Strohkirch with twenty years and the three full time tenure track faculty listed above and one adjunct faculty, Douglas Ginnever.

The faculty have years of industry work experience. The tenured faculty have years of teaching experience while the tenure track faculty have had various teaching experiences. The faculty has teaching responsibilities in the A.A.S. and BS degree programs and the Electrical Power Generation Certificate program.

f) Discuss the impact of adjunct and term faculty on the program

The University approved buy-outs for three members of the Heavy Equipment Department faculty. These buy-outs were made effective at the end of the 2003 winter term. For the 2003-2004 school year, five out of the six required adjunct faculty were hired to handle the additional loads created by the buy-outs. The sixth adjunct faculty member was turned down for employment the Friday before classes started. At the same time, the Heavy Equipment Department was in the process of hiring two tenure-track faculty members. A fourth buy-out was approved by the University. The last buy-out was made effective August 15, 2004.

The department was scheduled for an Academic Program Review which was due in September, 2004. Because of the faculty buy-outs, there were not enough full-time faculty members to collect the information and write the report within the allotted time frame. Therefore, a request to extend for one year was submitted (see memo that follows). The request was denied. In a memorandum dated November 17, 2004 from the

Academic Program Review Council, a recommendation was made by the Council to have the Heavy Equipment program faculty conduct a **complete** self-study in accordance with the procedures outlined in the document Academic Program Review: A Guide for Participants. The submission of the report is to on or before March 15, 2005.

g) Describe the impact of service courses

The impact of service courses offered by the Heavy Equipment Department has provided students enrolled in Product Design Engineering Technology, Automotive Engineering Technology, Automotive Service Technology and the Automotive/Heavy Equipment Management programs the opportunity to acquire additional knowledge of related industries. Acquiring additional knowledge and developing a wider range of transferable skills will allow our graduates to be more competitive in today's varied and highly competitive job markets.

The following Heavy Equipment Technology courses have been made available to the above programs:

- HEQT 110 Electronic Fundamentals
- HEQT 160 Fluid Power Fundamentals
- HEQT 230 Diesel Fuel System Technology
- HEQT 282 A.C. Electrical Power Generation
- HEQT 285 Generator Control & Switch Gear
- HSET 300 Failure Analysis
- HSET 302 Fleet Management
- HSET 403 Testing Systems and Analysis

h) Provide information with respect to the educational strategies used by the Heavy Equipment Department's faculty

Students in the Heavy Equipment Technology program learn to use shop manuals, reference charts, diagnostic instruments and special tools to diagnose equipment malfunctions. They identify problems through measurement and observation, interpret data collected and decide on a course of action. In hands-on labs the students repair, replace or adjust components and perform preventive maintenance tasks. Knowledge and skill development concentrations include inspection, diagnostics, repair/rebuild of all types of heavy duty equipment and mechanical/electrical components.

HSET provides the skills and knowledge required to test, diagnose, service and repair multiple interfacing and technically sophisticated systems used on equipment in the agricultural, construction, forestry, stationary power and trucking industries. Mechanical, electrical, electronic and hydraulic technology are addressed, along with failure analysis, troubleshooting procedures and techniques, metrology, product design for manufacturing and machining processes.

All Heavy Equipment Technology faculty have been involved with the following:

- Development of seminars and workshops focusing on the needs of the heavy equipment and the electrical power generation industries.
- Worked with AED to develop a standards manual along with an accreditation plan for secondary and post-secondary career centers. AED has taken on the responsibility of developing technical education task lists along with developing program accreditation standards that would best meet the needs of the heavy equipment industry, specifically for agricultural and construction equipment.
- Worked with AED, FSU and the State of Michigan legislature. Objective: Have the State of Michigan recognize AED as an accrediting organization for heavy equipment technology programs.
- Program accreditation:
    - Ferris State University's Heavy Equipment Technology program was the first in the United States to be accredited by AED. AED is the only organization recognized the heavy equipment industry to accredit post-secondary heavy equipment programs.
    - The HET program is ASE Master Certified for Medium and Heavy Duty Truck through the National Automotive Technicians Education Foundation (NATEF). To receive the certification, all instructors are required to be ASE certified in specific areas of instruction.

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

HEAVY EQUIPMENT TECHNOLOGY
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER
Curriculum Guide Sheet

NAME OF STUDENT_____ STUDENT I.D. _____

Total semester hours required for graduation: 68

NOTE: Meeting the requirements for graduation indicated on this sheet is the responsibility of the student. The student is also responsible for meeting all FSU General Education requirements as outlined in the university catalog. Your advisor is available to assist you.

FIRST YEAR - FALL SEMESTER (18 credits)			CREDITS/GRADE
HEQT	100	Trouble-Shooting Strategies	2
HEQT	101	Heavy Equipment Maintenance Fundamentals	2
HEQT	110	Heavy Equipment Electronics Fundamentals	4
ENGL	150	English 1	3
———	——	Cultural Enrichment Elective	3
MATH	116	Intermediate Algebra & Numerical Trigonometry (C- in MATH 110 or 19 ACT)	4

FIRST YEAR - WINTER SEMESTER (16 credits)			
HEQT	200	Planned Maintenance Systems	2
HEQT	210	Heavy Equipment Electrical Systems (HEQT 110)	4
HEQT	160	Fluid Power Fundamentals	4
WELD	146	Welding for Heavy Equipment	2
PHYS	130	Concepts of Physics (C- in MATH 110)	4

FIRST YEAR - SUMMER SEMESTER			
HEQT	193	Industry Internship	4

SECOND YEAR - FALL SEMESTER (16 credits)			
HEQT	201	Transport Refrigeration Systems	4
HEQT	120	Heavy Equipment Engine Technology	4
HEQT	240	Heavy Equipment Brakes and Suspension Systems (HEQT 101)	4
HEQT	270	Heavy Equipment Power Transfer Technology (HEQT 101)	4

SECOND YEAR - WINTER SEMESTER (14 credits)			
HEQT	230	Diesel Fuel Systems Technology (HEQT 120, HEQT 210)	4
HEQT	271	Heavy Equipment Automatic Transmissions (HEQT 160, HEQT 270)	4
ENGL	211	Industrial and Career Writing (ENGL 150)	3
PSYC	150	Introduction to Psychology	3

Depending on when a student enters the program, he or she will enroll in an internship program during the first or second summer after entering the program. The internship will consist of 12 weeks, 480 hours of on-the-job training. AAS Degree - 64 Credit Hours + 4 Credit Hour Summer Internship (480 contact hours). 68 Total Program Credit Hours.

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CURRICULUM REQUIREMENTS

HEAVY EQUIPMENT TECHNOLOGY
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER

TECHNICAL HOURS			CREDIT HOURS
HEQT	100	Trouble-Shooting Strategies	2
HEQT	101	H. E. Maintenance Fundamentals	2
HEQT	110	H. E. Electronics Fundamentals	4
HEQT	120	H. E. Engine Technology	4
HEQT	160	Fluid Power Fundamentals	4
HEQT	193	Industry Internship	4
HEQT	200	Planned Maintenance Systems	2
HEQT	201	Transport Refrigeration Systems	4
HEQT	210	H.E. Electrical Systems	4
HEQT	230	Diesel Fuel Systems Technology	4
HEQT	240	H. E. Brakes & Suspension Systems	4
HEQT	270	H. E. Power Transfer Technology	4
HEQT	271	Heavy Equipment Automatic Trans.	4
RELATED TECHNICAL COURSES			
WELD	146	Welding for Heavy Equipment	2

GENERAL EDUCATION			CREDIT HOURS
Commnication Competence			
ENGL	150	English 1	3
ENGL	211	Industrial and Career Writing	3
Scientific Understanding			
PHYS	130	Concepts of Physics	4
Quantitative Skills			
MATH	116	Interm. Algebra/Numerical Trig.	4
Cultural Enrichment			
Elective			3
Social Awareness			
PSYC	150	Introduction to Psychology	3

The following Certificates will be provided upon successful completion of the HET A.A.S. Degree and the following courses:

ELECTRICAL POWER GENERATION CERTIFICATE

HEQT	282	A.C. Power Generation	4
HEQT	285	Generator Ctrl. & Switch Gear System	4

KOMATSU EQUIPMENT REPAIR CERTIFICATE

HEQK	250	Parts and Service	2
HEQK	251	Equipment Elec/Electronics Ctrl.	4
HEQK	252	Hydraulic Excavator/Crushers	4
HEQK	253	Transmissions/Loaders/Crawlers	4
HEQK	293	AIS Komatsu Internship	4

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

Cultural Enrichment Credits - 3
Communication Credits - 6
Social Awareness Credits - 3
Scientific Understanding Credits - 3/4

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pm/cksh04f/heqt

(OVER)

Heavy Equipment Technology

APRC 2004-2005

section 3 of 3

CURICULUM REQUIREMENTS

HEAVY EQUIPMENT SERVICE ENGINEERING TECHNOLOGY
BACHELOR OF SCIENCE DEGREE

ENTRY CRITERIA:

1. Successfully completed an AAS Degree in Heavy Equipment Technology, or its equivalent.
2. A minimum 2.3 honor point average in the AAS major area course work.
3. Transfers from other Heavy Equipment Technology AAS Degree programs will be required to have taken HEQT 100; HEQT 160; HEQT 270; MATH 116, or its equivalent.

TECHNICAL			CREDIT HOURS
HSET	300	Applied Failure Analysis	4
HSET	302	Fleet Management	4
HSET	393	Industrial Internship	4
HSET	403	Testing Systems and Analysis	4
HSET	410	Interactive Electronic Controls	4
HSET	460	Heavy Equip. Adv. Hydraulic Sys.	4
Technical Related			
ACCT	201	Principles of Accounting 1	3
ETEC	140	Engineering Graphics	3
MATL	240	Introduction to Material Science	4
MGMT	301	Applied Management	3

GENERAL EDUCATION			CREDIT HOURS
Communication Competence			
COMM	221	Small Group Decision Making	3
ENGL	311	Advanced Technical Writing	3
Scientific Understanding			
PHYS	211	Introductory Physics 1	4
Quantitative Skills			
MATH	126	Algebra & Analytic Trigonometry	4
Cultural Enrichment			
Elective			3
SURE	331	Ethics & Prof. in EGRG/TECH	3
Social Awareness			
ECON	221	Principles of Economics 1	3
PLSC	311	American State & Local Gov't.	3

Directed Elective (Choose 7 credit hours from list):

EHSM	322	Accident Investigation & Report	2
EHSM	330	OSHA Laws and Regulations	2
MFGE	352	Design for Manufacturing	2
MFGE	353	Statistical Quality Control	3
PDET	412	Statistics/Ergonomics	2
BLAW	301	Legal Environment of Business	3
EHSM	331	Mechanical Safety	3
ISYS	305	Software Systems	3
EHSM	445	Safety Management	4
MECH	340	Statistics and Strength of Materials	4

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FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

HEAVY EQUIPMENT SERVICE ENGINEERING TECHNOLOGY
BACHELOR OF SCIENCE DEGREE
Curriculum Guide Sheet

BS Degree Minimum General Education Requirements

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

Communications Competence: 12 semester hours

Quantitative Skills: MATH 115 or ACT scores

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

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

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

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

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

Total semester hours required for graduation: 130 + 8 hours of internship (including 64+4 cr hr internship from AAS Degree)

			CREDITS/GRADE
THIRD YEAR - FALL SEMESTER (18 credits)			
MGMT	301	Applied Management	3
MATL	240	Introduction to Material Science	4
HSET	302	Fleet Management	4
COMM	221	Small Group Decision Making	3
MATH	126	Algebra and Analytical Trigonometry (C- in MATH 116)	4
THIRD YEAR - WINTER SEMESTER (17 credits)			
SURE	331	Ethics & Professionalism in EGRG/TECH (ENGL 150)	3
PHYS	211	Introductory Physics 1 (C- in MATH 116 or 120)	4
PLSC	311	American State and Local Government	3
HSET	300	Applied Failure Analysis (MATL 240)	4
ETEC	140	Engineering Graphics	3
THIRD YEAR - SUMMER SEMESTER (4 credits)			
HSET	393	Industry Internship	4
FOURTH YEAR - FALL SEMESTER (14 credits)			
HSET	460	Heavy Equipment Advanced Hydraulic Systems (MATH 126, HEQT 160)	4
ELECTIVE		Cultural Enrichment Elective	3
ACCT	201	Principles of Accounting 1 (C- in MATH 110)	3
ELECTIVE		Directed Elective (see list on reverse side)	4
FOURTH YEAR - WINTER SEMESTER (17 credits)			
HSET	410	Interactive Electronic Controls (HEQT 271, HSET 460)	4
ENGL	311	Advanced Technical Writing (ENGL 211 or 250)	3
ECON	221	Principles of Economics 1 (C- in MATH 110)	3
HSET	403	Testing Systems and Analysis	4
ELECTIVE		Directed Elective (see list on reverse side)	3

Keith Cripe

Education
MA Educational Administration, Central Michigan University, 1976
BS Vocational Education, Indiana State University, 1969
Certificate, Diesel and Heavy Equipment, Ferris State College, 1964
ASE Certified – Medium/Heavy Truck Technician

- Diesel Engines
- Electrical/Electronics
- Heating/Ventilation/Air Conditioning

Continuing Education

- Member, AED National Technical Committee
  - Attendance at EETC Conference resulted in accreditation of the A.A.S. Heavy Equipment Technology program
- Events Coordinator, Skills USA-VICA Heavy Equipment Competition
- Chair, Michigan Committee for Skills USA-VICA Heavy Equipment Competition
- Attendee, National Skills USA-VICA Competition
- Wrote and performed the technical portion of Cylinder Head Reconditioning, a one-hour instructional video produced by Seal Power Corporation
- Developer, Heavy Equipment Technology Transport Refrigeration course
- Developer/Instructor, MDOT Technical Workshops
- ASE certification, Electrical/Electronics and Heating/Ventilation/Air Conditioning
- Member, Automotive Service Excellence Committee
- Attended work shops in the following areas:
  - Mechanical and electronic fuel injection systems
  - Electrical and electronic troubleshooting
  - Refrigeration
  - Hydraulics
  - Computer software

Teaching Assignments

- Heavy Equipment Maintenance Fundamentals
- Heavy Equipment Electronic Fundamentals
- Heavy Equipment Engine Technology
- Heavy Equipment Electrical Systems
- Fluid Power Fundamentals – Hydraulics
- Transport Refrigeration Systems
- Diesel Fuel System Technology
- Heavy Equipment Lab Practice
- Heavy Equipment Power Transfer

University Involvement

- Member, Associated Equipment Distributors (AED) National Technical Committee
  - Member, Evaluation Accreditation Committee
  - Developed standards and procedures for postsecondary heavy equipment and agricultural programs throughout the United States
  - Chair, Electrical Committee – wrote standards used in the electrical section of the manual

    - Initiated sequence by which the Heavy Equipment Technology program was accredited by AED
- Developed and presented five 2-day technical seminars to practicing heavy equipment technicians which were offered through Ferris's Transportation Institute
- Developed electrical power generation seminars

Work Experience

- Department Chair, Heavy Equipment Technology, 1999-Present
- Program Coordinator, Heavy Equipment Technology Program; Director, Transportation Institute, 1998-1999
- Professor, Heavy Equipment Technology Program, 1998-1999
- Program Coordinator, Heavy Equipment Technology Program, 1996-1997
- Associate Professor, Automotive and Heavy Equipment Department, 1988-1996
- Assistant Professor, Automotive and Heavy Equipment Department, 1977-1988
- Instructor, Automotive and Heavy Equipment Department, 1969-1977

Douglas A. Ginnever

Education
ICS Electrical Courses, 1989-Present
Graduate, 1977, Morley-Stanwood High School – Carpentry Curriculum

Work Experience

- Ferris State University, Big Rapids, MI
  - Custodian – general maintenance of buildings on campus, August 1979-Present
  - Grounds Worker – mowing, snow removal, landscape construction, and general maintenance of parking lots, roads and lawns
  - Grounds Operator/Specialist – application of pesticides, operation of heavy equipment commercial mowers and tractors, replacement of curbing, concrete and brick walkways, maintenance and construction of landscape designs, June 1985-Present
- Construction work, part time 1978-Present
- Hammady Food Stores, Big Rapids, MI, September 1980-July 1981 – wrapped meat for display case and cut meat
- Kroger, Big Rapids, MI, March 1979-September 1980 – Wrapped meat for display case and cut meat.
- Reynolds Metal Company, Grand Rapids, MI, February 1978-December 1978 – material handler in the buffing department and worked in the casting house handling material (bumpers).
- Boven's Custom Butchering, Morley, MI, August 1976-February 1978 – Wrapped meat and general cleaning.

Gary Maike

Education

- Masters Degree, General Administration, Central Michigan University, Mt. Pleasant, MI, 1994
- Bachelor of Science, Automotive and Heavy Equipment Technology, Ferris State University, Big Rapids, MI, 1982
- Associates Degree, Heavy Equipment Service, Ferris State University, Big Rapids, MI, 1980

Continuing Education

- Ford Parts & Service Division and General Motors Training Center
  - Power Train
  - Engine
  - Fuel Management
  - Emissions
  - GM specialized electronics training

- Hunter Engineering Company, St. Louis, MO
  - Suspension
  - Alignment
  - Brakes
  - Vibration Diagnosis
  - Tire Service

- Cuyahoga Community College, Cleveland, OH
  - Advisory Board Member representing General Motors ASEP

- Attended training and facilitated implementation of Chevrolet Motor Division's Service Supremacy operating system at numerous franchised dealerships

- SkillsUSA-VICA Heavy Equipment Contest
  - Event Coordinator, Ferris State University 2004-2005

- Ford, General Motors, and Hunter Engineering Companies - Seminars
  - Interpersonal Skills
  - Team Building
  - Customer Satisfaction

- Graduate – Truck Marketing Institute's Precision Truck Training

Teaching Assignments

- Heavy Equipment Technology, Ferris State University
  - Trouble Shooting Strategies
  - Heavy Equipment Brakes and Suspension Systems
  - Fleet Management

Work Experience

- Assistant Professor, Heavy Equipment Technology Program, Ferris State University, Big Rapids, MI, 2004-Present

- Sales Representative, Hunter Engineering Company, 1997-2004
- Service and Sales Representative, Chevrolet Motor Division
- District Service Manager, Ford Parts and Service Division

Maike

John Strohkirch

Education

- BS, Trade Technical Education, Ferris State University, 1981
- A.A.S. Automotive Machine Technology, Ferris State University, 1976
- A.A.S. Automotive Service Technology, Ferris State University, 1974

Continuing Education

- Ferris State University
  - Basic Metallurgy
  - Electrical Electronics Technology
  - Heavy Equipment Technical Symposium
  - Heavy Equipment Technical Update Seminar
- Michigan State University
  - 9 credits towards Masters degree
- ASE Certified Master Medium/Heavy Truck Technician
  - Gasoline Engines
  - Diesel Engines
  - Drive Train
  - Brakes, Suspension and Steering
  - Electrical/Electronic Systems
  - Heating/Vent Air Conditioning
  - Preventive Maintenance Inspection
  - DC Circuits
  - AC Circuits
  - Basic Electronics
  - Digital Logic
- AIS Company
  - Advanced Electronics
  - PC300/400 Excavator
- On-site Power Generation School
- Principles of Failure Analysis, American Society of Metals (ASM)
- Electronic Engines, Technology Education Workshop, FABCO Equipment
- NAPA Aluminum Cylinder Head Course, Dana Customer Training Services
- Empire Southwest CAT
  - Powertrain Failure Analysis
  - Applied Failure Analysis II
- MichiganCAT
  - Applied Failure Analysis I
- Electronic Controlled Hydraulic Valves & Pumps, VocEd, Michigan State University
- Caterpillar
  - Vocational Technical Instructor Update
- General Motors
  - Specialized Electronics Training Program
- Allison Gas Turbine School
  - GT501KB Heavy Maintenance
- Cummins
  - Paralleling and Load Sharing
  - Generator Set Theory & Troubleshooting

- Detroit Diesel
    - Electric Power
- Allen Underhood Electronics
- Sun Scope & Volt Amp Tester Operational Workshop
- Froude/Go Power Data Acquisition Systems
- Enercon Switch Gear Operation
- Vickers Hydraulic-Electronically Controlled Hydraulic Systems
- Total Wheel Alignment Seminar

Teaching Assignments

- Heavy Equipment Technology
    - Electronics Fundamentals
    - Heavy Equipment Engine Technology
    - Komatsu Excavator
    - Komatsu Applied Electronics
    - Planned Maintenance Systems
    - Transport Refrigeration Systems
    - Heavy Equipment Electrical Systems
    - Heavy Equipment Engine Rebuilding
    - Diesel Fuel Systems Technology
    - Heavy Equipment Brakes and Suspension
    - Heavy Equipment Laboratory Practice
    - AC Power Generation
    - Generator Controls and Switchgear Systems
    - Komatsu Wheel Loaders
- Heavy Equipment Service Engineering Technology
    - Industry Internship
    - Failure Analysis
- Automotive Engine Machine Technology
    - Automotive Machine Shop 1
    - Automotive Machine Shop 2
    - Gas and Diesel Engines
    - Parts Management

University Involvement

- Senator, Ferris State University Academic Senate
- Chairman, Heavy Duty Engine Program Review Panel
- Chairman, Heavy Equipment Technology Programs Curriculum Committee
- Student recruitment
- Committee Work to include:
    - Blue Ribbon Electronics, Ferris State University – Alumni & Development Committee
    - Automotive Department Safety Committee
    - Automotive Department Bachelors Degree Committee
    - NACAT Convention Committee
    - Electrical Generation Systems Association – Educational Committee
    - College of Technology Committee on Curriculum and Instruction
- Advisor, Society of Automotive Engineers – FSU Student Chapter
- President, Ferris State Veterans Alumni Association

Community Activities

- Coach, Big Rapids Little League
- Assistant Coach, Big Rapids High School Equestrian Team
- Member, Mecosta County Agricultural Fair Association
- Project Assistant Leader, 4-H Horse Project
- Equipment Manager, Big Rapids Jr. Hockey Association
- Assistant, Big Rapids Figure Skating Club Ice Show
- Trustee, Michigan Quarter Horse Association
- Association Advisor, Michigan Junior Quarter Horse Association

Work Experience

- Automotive Repair Technician December 1977-November 1983
- Service Station Repair Technician, November 1976-December 1977
- Chevrolet Dealership Technician, June 1975-December 1975
- Fire Control Technician, United States Navy, 1969-1973
- Service Station Repair Technician, June 1966-September 1969

Military Training

- U.S. Navy, Four Day Fire Fighting School
- Radar Signal Processing Equipment Maintenance School
- Fire Control Technician-Class A School
- U.S. Navy Correspondence Course:
    - Fire Control Gun Three and Two, Part Two
    - Fire Control Gun Three and Two, Part One

Darren L. Wilson

Education

- 4 credits towards Masters Degree, University of Wisconsin-Stout, 2003
- B.S. Business Management, Ferris State University, 1990
- A.A.S. Heavy Equipment Technology, Ferris State University, 1998

Continuing Education

- Caterpillar Technical Training
  - Service Information System, 1998
  - Wire Maintenance & Schematic Reading, 1998
  - Service Information Management (SIMS), 1998
  - Failure Analysis I, 1998
  - Electronic Systems I, 1998
  - Failure Analysis II, 1998
  - Failure Analysis III, 1999
  - ET/ECAP, 1999
  - Engine Diagnostics, 2000
  - 902/906 Compact Wheel Loader, 2000
  - Hydraulic Hose Assembly, 2000
  - Failure Analysis IV, 2000
  - 3116 MUI, 2000
  - Contamination Control, 2001
  - Articulated Trucks, 2003
  - Telehandler "B" Series, 2004
  - Trimble Grade Control Operation & Installation, 2004

- ASE Certified Master Medium/Heavy Truck Technician, 1999-Present

- Sales Class, Grand Rapids Community College, 1996

- Member, NOCTI Committee – revision of industry competency tests, 1994

- Branch Maintenance Manager Essential Skills Course, Ryder Truck Rentals, 1994

- EPA Certification – CFC Handling/Recovery, Ryder Truck Rentals, 1994

- Vehicle Inspection Certification, Ryder Truck Rentals, 1993

- Warranty Procedures Certification, Ryder Truck Rentals, 1992

Teaching Assignments

- Assistant Professor, Heavy Equipment Technology, Ferris State University, 2004-Present
  - Trouble Shooting Strategies
  - Diesel Fuel Systems Technology
  - Power Transfer Systems Technology

Work Experience

- Assistant Professor, Heavy Equipment Technology, Ferris State University, 2004-Present
- Service Technician, FABCO Equipment, Inc., 1997-2004
- Sales Technician, Weller Truck Parts, Inc., 1996-1997
- Ryder Truck Rental, Inc., 1991-1995

Community Activities

- Deacon, Spring Creek Church, 2000-2003
- Sunday School Teacher, Spring Creek Church, 1997-2004
- Education Committee, Spring Creek Church, 2000-2001
- Member, Building & Grounds Committee, Spring Creek Church, 2001-2002
- Member, Missionary Committee, Spring Creek Church, 2002-2003
- Member, Car Ministry Team, Spring Creek Church – provided vehicle maintenance and repair for widows and single parents
- Leader, Awana Cubbies Children's Program, 2000
- Volunteer, Camp Fairwood – assisted with preventative maintenance and repair on camp maintenance and recreational equipment, 2000-2005

Jerome L. Zmyslowski

Education
B.S. Mathematics, Lawrence Technological University, Southfield, MI, 1977
B.S. Physics, Lawrence Technological University, Southfield, MI, 1978
ASE Certified Heavy Truck Electrical Systems
Certified Fluid Power Specialist
Certified Fluid Power Accredited Instructor

Continuing Education
- Ferris State University, Big Rapids, MI
  - Foundations & Organization of Career and Technical Education
  - Issues in Career and Technical Education
  - Evaluation in Career and Technical Education
- Oakland University, Detroit, MI
  - State-Space Analysis

Teaching Assignments
- Fluid Power Fundamentals
- Heavy Equipment Electronics Fundamentals
- Heavy Equipment Electrical Systems
- Heavy Equipment Advanced Hydraulic Systems
- Testing Systems and Analysis
- Interactive Electronic Controls

Consulting and Training
- Consultant, United States Steel Corp.
- Hydraulic training for MDOT
- System design for Bandit Industries
- System design for Load Lifter

Work Experience
- Assistant Professor, Ferris State University, August 2001-Present
- Self-employed, Fluid Power Professionals, Inc., August 1999-Present
  - Power and motion consultant
- Engineering Manager-System Application, Vickers, Inc., February 1978-September 1999
  - Supervised engineering, lab tech and service personnel
  - Sole systems application responsibility for Case Corporation
  - Taught technical training/seminars to customers, distributors & Vickers Hydraulic School
  - International presentations and field experience
  - Supported/maintained digital data acquisition equipment
  - Provided CADD and documentation support to sales & field personnel
- Senior Project Engineer, Vickers, Inc.
  - Computer simulation and stability analysis of hydraulic components/systems
  - Designed hydraulic/electro-hydraulic components
  - Designed and tested digital close loop micro based control systems for hydraulic systems
  - Field supervision of test and service personnel at customer site

    - Engineering support to Vickers Aerospace, Marine and Defense Division
- Design Engineer, Rockwell International, February 1976-February 1978
    - Designed, tested and evaluated off-highway vehicle brakes and axles

Kenny R. Acton

Education

Master of Arts, Curriculum and Instruction, Michigan State University, 1989
Bachelor of Science, Agricultural Mechanization, Michigan State University, 1970

Continuing Education

- Ferris State University, Big Rapids, MI
  - Industrial Automation
  - Statistical Inference
  - Business Statistics

- Central Michigan University, Mt. Pleasant, MI
  - Managerial Accounting

- Heathkit Electronics Courses
  - Semi-conductor Devices
  - Electronic Circuits
  - AC Electronics
  - DC Electronics

- Acme School of Die Design Engineering, South Bend, IN
  - Tool Design

Teaching Assignments

- Heavy Equipment Service Engineering Technology
  - Heavy Equipment Advanced Hydraulics, developed course
  - Testing Systems and Analysis, developed course
  - Interfacing Systems Analysis, course in development
  - Industry Internship

- Heavy Equipment Technology
  - Heavy Equipment Electrical Systems
  - Fluid Power Fundamentals
  - Heavy Equipment Electronics Fundamentals
  - Heavy Equipment Maintenance Fundamentals
  - Trouble-Shooting Strategies, developed course

- Heavy Equipment Service
  - Special Studies
  - Hydraulics
  - Electrical and Fuel Systems

- Heavy Duty Engine Technician
  - Basic Shop Practices
  - Basic Electricity – Auto Service
  - Electrical Fuel Systems I

Consulting and Training

- General Motors Corporation

- A-C Spark Plug Division, Delphi, Wichita Falls, TX
  - Basic Hydraulics, 1984
  - Advanced Hydraulics, 1991
  - Pneumatic Systems Design Course, 1992
  - Injection Mold Machine Hydraulics, 1996

- Hutchinson Company
  Paulstra CRC Division, Grand Rapids, MI
  - Basic Hydraulics, 1988

University Involvement

- Programmatic Marketing Committee
- Semester Transition Committee
- Semester Feasibility Task Force
- Historical Archives Committee
- Centennial Committee

Work Experience

- Ferris State University, Big Rapids, MI
  - Program Coordinator (one semester), 1997
  - Associate Professor, 1990
  - Assistant Professor, 1983
  - Technical Instructor, 1978

- Deere and Company, Dubuque, IA
  - Parts and Service Training Instructor, 1977

- John Deere Industrial Equipment Company, Baltimore, MD
  - Area Manager of Parts and Service, 1974

- John Deere Dubuque Works, Dubuque, IA
  - Factory Parts and Service Representative, 1972
  - Senior Engineering Technician, 1970

- John R. Snell Engineers, Lansing, MI
  - Machine Design and Project Coordinator, 1969
  - Sewage Treatment Plants Design, 1966

- National Standard Company, Niles, MI
  - Research and Development Coordinator, 1964
  - Machine Design and Parts Manuals, 1962

- Overton Machine Company, Dowagiac, MI
  - Engineer's Assistant, 1960

Awards

- Commendation for outstanding job performance, A-C Division of General Motors Corporation

Publications

- *The Work and Industry Profiles of Heavy Equipment Graduates and the Relationship of Additional Degrees upon Those Profiles*. Ferris State University, Big Rapids, MI, 1989.

- *A Model System for a Solution to the Refuse Waste Problem in Livingston County, Michigan.* **Student Water Publications**, Michigan State University, East Lansing, MI, 1970.

Community Service

- First United Methodist Church, Big Rapids, MI
  - Past Chairman, Administrative Council
  - Member, Remodeling Committee

- Volunteer, Habitat for Humanities Building Project

- Past Master, #171 Free and Accepted Masons, Big Rapids, MI

- Past DeMolay Advisor

William T. Hillary

Education

- Western Michigan University, Kalamazoo, MI, 1991
  - Education Leadership
  - Introduction to Research

- Ferris State University, Big Rapids, MI, 1989-1994
  - Microcomputer Applications, 1994
  - Industrial Automation, 1991
  - A.C. Circuits, 1990
  - Digital Logic, 1990
  - D.C. Circuits, 1989

Continuing Education

- Michigan CAT
  - General Powertrain, January 1993

- Allison Transmission
  - Service Training, MT-600 Series, May 1992
  - Service Training, Electronic Controls, May 1992

- Caterpillar
  - Voc-ed Instructor Training, August 1986
  - CAT Engines, August 1986

- General Motors Corporation
  - GM-SET #18.001.02, October 1986

- Ford Motor Corporation
  - Air Brakes Seminar, February 1995

- Paradox Seminar
  - Computer Course, September 1995

- On-Line Computers
  - Computer Course, October 1995

- The Internet & World Wide Web Information Conference, October 1995

- Competency-Based Education for Vocational Education, November 1977

- Northwestern Business College, Lima, OH
  - Shop Instruction Techniques, November 1979

- GM Training Center, Warren Michigan
  - 71 & 92 Series Diesel Engine Rebuild School, 1980
  - Electrical Diagnosis, April 1982
  - 6.2L Diesel Engine, July 1985

- Deutz Diesel Engine School, Richmond, IN
  - Deutz Diesel Engine Overhaul, February 1984

- AC Delco
  - Electronic Fuel Injection Systems, March 1985

- Delta College
  - GM-SET #18.001.02 Electrical Seminar, August 1986

- Computer Literacy Course, November 1986

Teaching Assignments

- Heavy Equipment Classes, Ferris State University
  - Gas and Diesel Engines
  - Electrical and Fuel Systems
  - Service Area
  - Heavy Duty Drives
  - Automatic Transmissions
  - Basic Electronics
  - Brakes and Suspension Systems

- Rockwell International, Summer 1988
  - Transmissions

- Mid-State Technical Institute
  - Electrical
  - Hydraulics
  - Fuel Injection
  - Carburetion
  - Brakes & Suspension

- Newaygo County Area Vocational Center
  - Diesel Engine Repair
  - Hydraulics
  - Fuel Injection
  - Carburetion
  - Electrical
  - Employability Skills

Heavy Equipment Program Involvement

- Heavy Equipment Building Safety Representative
- Maintained and refurbished the engines lab
- Heavy Equipment Library Liaison
- Service Floor Coordinator
- Helped develop the Heavy Equipment Engineering Service Technology Degree
- Helped rewrite all courses of study and course syllabi for the Heavy Equipment Technology Program
- Chaired Heavy Equipment Program Scholarship Committee
- CHAMP Bus Project with the Michigan Department of Transportation

- Member of the Articulation Committee for the Heavy Equipment Program
- Developed the course of studies for Automatic Transmissions, Brakes and Suspension, Heavy Duty Drives, and Basic Electronics

University Involvement

- Ferris State University, College of Technology Curriculum Committee, 1993-1996
- Ferris State University Faculty Advisory Council, 1988-1989

Related Work Experience

- Deur Venture, White Cloud, MI
  - Truck Mechanic and Driver, Summers 1991-1995
- Rockwell International, Troy, MI
  - Teaching and developing programs, Summer 1988
- Michigan Department of Transportation, Alpena, MI
  - CHAMP Project, 1986-1986
- Modern Roofing, Grand Rapids, MI
  - Mechanic and roofing, June-August 1973
- AIS Construction Equipment Company, Grand Rapids, MI
  - Mechanic, June-August 1973
- A Company, 2nd Battalion, Ft. Belvoir, VA
  - Heavy Equipment Repair Teacher, August 1972 – March 1973
- 902nd Engineer Company, Ft. Belvoir, VA
  - Mechanic, August 1971- August 1972

Bruce W. Jacobs

Education

- Master of Arts, Curriculum and Instruction, Michigan State University, 1989
- Bachelor of Science, Trade Technical Education, Ferris State College, Big Rapids, MI 1970
- Associate of Applied Science, Heavy Equipment Service, Ferris State College, Big Rapids, MI, 1968

Continuing Education

- All courses listed were completed at Ferris State University, Big Rapids, MI
  - Spring 1988-1989 DC Circuits
  - Winter 1989-1990 AC Circuits
  - Sprint 1989-1990 Digital Logic
  - Fall 1990-1991 Basic Electronics
  - Winter 1990-1991 Industrial Automation
  - Spring 1990-1991 Basic Pulse Circuits
  - Fall 1991-1993 Business Statistics
  - Winter 1992-1993 Microcomputer Program Applications
  - Spring 1992-1993 Microcomputer Hardware Systems
  - Winter 1993-1994 Microcomputer Software Analysis
  - Fall 1993-1994 Introduction to Material Science
  - Winter 1995-1996 Local Area Networks
  - Winter 1995-1996 Microsoft Excel
  - Winter 1995-1996 Microsoft Word
  - Winter 1995-1996 Microsoft PowerPoint
  - Winter 1997-1998 Multimedia

Teaching Assignments

- Heavy Equipment Service Program
  - Basic Electricity
  - Basic Shop Practices
  - Diesel and Gas Engines
  - Fuel Injection 1
  - Fuel and Electrical Systems
  - Hydraulics
  - Service Area I & II
  - Service Management

- Heavy Equipment Service Technology
  - Heavy Equipment Maintenance Fundamentals
  - Planned Maintenance Systems
  - Troubleshooting Strategies
  - Heavy Equipment Lab Practice
  - Fluid Power Fundamentals
  - Diesel Engines

- Heavy Duty Engine Program
  - Basic Shop Practice

- Auto Service Program
    - Service Management

University Involvement

- University Technology Committee
- College of Technology Information Technologies Group
- College of Technology Promotion Committee
- University Curriculum Committee
- Chair, Undergraduate Council
- Member, President's Fiscal Advisory Committee
- Member, Undergraduate Council
- Automotive/Heavy Equipment Department Curriculum Committee
- College of Technology Promotion Committee

Work Experience

- Ferris State University, Big Rapids, MI
    - Professor, Heavy Equipment Technology, Fall 1994-Summer 2004
    - Associate Professor, Heavy Equipment Service, Fall 1987-Fall 1994
    - Assistant Professor, Heavy Equipment Service, Fall 1982-Fall 1987
    - Technical Instructor, Heavy Equipment Service, Winter 1973-Fall 1982

John Shaltry

Education
PhD, College and University Administration, Michigan State University, 1991
MA, Educational Administration, Eastern Michigan University, 1975
BS, Trade and Technical Teaching, Ferris State University, 1972
AAS, Heavy Equipment Technology, HD Truck and Equipment, 1968

Teaching Assignments

- Professor, Program Coordinator, Heavy Equipment Technology, Ferris State University
  - A two year Associate Degree program providing repair technicians to the heavy equipment and trucking industry

- Professor, Heavy Equipment Service Engineering Technology, Ferris State University
  - A four year Bachelors Degree offering more specialized and advanced courses in the technology providing the industry with people who can work as higher level technicians, technical representatives or managers in the heavy equipment/trucking repair industry.

Consulting and Training

- Coordinated State of Michigan VICA state level competition in the field of Heavy Duty Diesel for secondary and post-secondary competitors.
- Conducted seminars in all facets of heavy equipment maintenance and fleet management

Additional Work Experience

- Senior Master Sergeant and Transportation Manager, U.S. Air Force Reserves, Selfridge Air National Guard, Michigan
  - Responsibilities included vehicle operations, special purpose vehicle maintenance shop, general purpose vehicle maintenance shop, air cargo movement, and cargo pacing and crating shop.

- Vehicle Maintenance Supervisor, Western Company of North America, Alice, TX, June 1981-April 1983

- Corporate Equipment Maintenance Manager, Eastern Region, Western Company of North America, Cambridge, OH, April 1983-August 1984

- Maintenance Supervisor, REA Express, Detroit & Grand Rapids, MI, June 1968-July 1969

- Heavy Duty Truck Technician, Dermody Truck Company, Grand Rapids, MI, July 1969-July 1971

Gary L. Sievert

Education

- Master of Arts, Education Leadership, Eastern Michigan University, Ypsilanti, MI, 1978
- Bachelor of Science, Teacher Education, 1973
  Associate Degree, 1969
  Technical Trade Teaching, Automotive Service and Truck Diesel, and Heavy Equipment
  Ferris State University, Big Rapids, MI, 1973

Continuing Education, Certificates, Workshops and Conferences

- Detroit Diesel and Cummins Engines – Detroit Diesel Technical Center
- JJ Keller Compliance Workshops
  - Federal Motor Carrier Safety Regulations
- Keller Technical Institute – DOT's Alcohol & Drug Testing Regulations (49CFR Part 382 and Part 40)
- State Certified Commercial Driver's License (CDL) Examiner Skills Test in Auto and Motorcycle, State of Michigan Testing Requirements
- Continuing Secondary Teaching Certificate
- Continuing State Vocational Teaching Certificate
- Master Mechanic Certification, Heavy Truck & Automotive Service
- Dale Carnegie Leadership graduate, 12 week course

Work Experience

- Instructor, Genesee Area Skill Center, Flint, MI, 1973-1978
  High school level vocation education program serving twenty-eight high schools. Automotive Machine and Service, Commercial Truck/Diesel. Taught all technical courses in the Commercial Truck program.

- Fleet Manager, Sievert Brothers Concrete, Manistee, MI, 1978-1980
  Responsible for the management of all heavy equipment including mixer trucks, double tandem gravel trains, loaders and single trucks, and rental equipment and stationary aggregate processing machinery.

- Instructor, Mid-Michigan Community College, Harrison, MI, 1980-1986
  Two year associate degree program for diesel truck repair. Taught Diesel Engine Maintenance, Four Stroke Diesel & Two Stroke Diesel Engines, Diesel Engine Tune-up and Fuel Systems, Truck Brakes and Suspension, Truck drive Trains, Basic Hydraulics, Heavy Duty Electrical Systems.

- Branch Supervisor, Atlas Truck Rental & Leasing, Cadillac, MI, 1986-1988
  Active in the start-up of this branch from the pre-construction phase. Managed rental fleet of twelve units and on-site local lease fleet of twenty units. Coordinated reservations, purchased fuel supplies, and oversaw maintenance services of two on-site mechanics.

- Service Coordinator, Cadillac Truck Service, Cadillac, MI, 1988-August 1998
  Coordinated and facilitated service for heavy duty tractors/trailers. Using effective communication skills, conducted customer interviews to review problems. Prepared repair orders with an accurate estimate, determined the service scheduling timeline and worked with the Shop Foreman and Parts Department to oversee the project status and

coordinated parts needs. Developed a Project Roster which was consistently updated to reflect project status. Cleared projects upon completion, prepared invoices, and entered shop productivity information into the computer system. Served as a state license CDL Examiner. Conducted road skills, auto and motorcycle examinations for six northwest Michigan counties.

- Assistant Professor, Ferris State University, Big Rapids, MI, August 1988-May 2003
  Instructed Heavy Equipment Lab Practice and Planned Maintenance Systems.

Michael Anderson

Education

- MS, Information Systems Management, Ferris State University, 2003
- Certificate, Advanced Studies in Quality Management, Ferris State University, 2003
- BS, Computer Information Systems, 2002

Honors and Activities

- Deans List every semester
- Member, Firewall Solution Committee, Ferris State University

Work Experience

- **Ferris State University**
  - Adjunct Faculty, Heavy Equipment Technology Program, College of Technology – exposed students to various fleet management software programs used in the heavy equipment industry. Exposed students to project management.
  - Graduate Assistant/Web Developer/Database Administrator/Network Administrator, College of Business – Developed web pages, and administered college's servers and networks
  - Student Manager, Business Technology Consortium (BTC) – Managed central operations in BTC, responsible for two student employees, took on a database development project, became a member of the Firewall Selection Committee, responsible for Norton Anti Virus servers and security camera operations.

David W. Cloud

Education

- Associates Degree, ITT Technical Institute, Grand Rapids, MI 2002

Specialized Skills

- MS Word, Excel and PowerPoint
- MS Windows 98/XP
- ESD (electrostatic discharge)
- Familiar with IPC-7711 & IPC-7721 Standards governing rework, repair and modification of printed boards and electronic assemblies

Work Experience

- *ZF Service Manager*, Weller Truck Parts, Inc., Grand Rapids, MI, March 2002-Present
  - Promoted through positions of increasing responsibility to establish and lead a department dedicated to building, tracking and supplying a complete parts and unit inventory of Japanese and German heavy-duty automatic transmissions to expand the market reach of one of the Midwest's largest remanufacturing and repair companies.
- *Allison Department Service Manager*, August 2001-March 2002
  - Advanced to lead a 26-member department in the overhaul and repair of the full line of Allison transmissions with a commitment to constant improvements in quality, turnaround time and customer training. Responsibilities included negotiating warranty issues with customers, writing claims to Allison Transmissions, responding to quoted from end-users and government agencies and scheduling one on-road technician.
- *Team Leader*, February 1996-August 2001
  - Leveraged previous experience with hydraulic and electronic series transmissions to accurately troubleshoot and correct the full range of problems involving on-highway models of Allison transmissions, with special emphasis on Commercial Electronic Controls (CEC) and World Transmission (WT) control Systems.
- *Mechanic*, July 1993-February 1996
  - Assigned to diagnose, repair and dyno test electrical and hydraulic transmission faults both in the shop and at customer locations.
- *Dispatch Department Manager*, February 1993-July 1993
  - Handled a multitude of functions in an extremely fast-paced, demanding environment with responsibility for coordinating the movement of up to 30 vehicles in the timely pick-up and delivery of parts and products between the company and its clients. Devised efficient routes to accommodate driver preferences and shift length and frequently inspected vehicles for safety.
- *Assistant Transportation Manager*, Goodwill Industries, Grand Rapids, MI, September 1991-February 1993
  - Oversaw daily loading and unloading, performed regular maintenance and created routes for a fleet of five trucks responsible for picking up donations and delivering goods to stores for this nationwide community service organization. Assisted in development of floor plans for new stores.
- *Specialist E-4*, United States Army, Colorado Springs, CO, July 1986-July 1991
  - Recalled to service in Germany to perform Military Occupation Specialty, 63B Light Wheel Vehicle Mechanic, during the Gulf war, which involved preparing all types of vehicles from Jeeps to five-ton tractors for deployment.

- *Mechanic,* July 1986-July 1990
    - Formed and led four to six-member scheduled and unscheduled maintenance groups responsible for increasing the operational readiness of 120 pieces of equipment ranging from pick-up trucks to five-ton tactical wheeled vehicles.

Bradley D. Stitt

Education
A.A.S., Heavy Equipment Technology, Ferris State University, Big Rapids, MI, 2003
Electrical Power Generation Certificate, Ferris State University, Big Rapids, MI, 2003
Combat Lifesaver School, 1995
Primary Leadership Development School, 1993
Heavy Equipment Operator School, 1991

Certifications
- Motor Vehicle Certificate with Truck Drive Trains, Suspension, Brakes, Diesel Engine, Electrical and Automotive Electrical, Brakes, Front End & Steering, Heating & Air Conditioning Endorsements
- 609 Certification for Refrigerant Recovery, Recycling, and Handling
- Commercial Drivers License (CDL) with ANT Endorsements
- Michigan Department of Agriculture Farm Pickup Bulk Haulers License
- State of Michigan Builders License

Awards and Achievements
- 2000 California Anti-drug Service Ribbon for work performed on the border road of Mexico and California
- 1999 Army Achievement Medal for distinguished technical proficiency as a heavy equipment operator
- 1993 Graduated in the top four percent of Primary Leadership Development course class
- 1992 Governor's Twenty Award for distinguished marksmanship ability with the M-16 rifle

Honors and Activities
- Dean's List 2001, 2002 and 2003
- Member, Heavy Equipment Association
- Member, International Texas Longhorn Association
- Member, Great Lakes Texas Longhorn Association

Work Experience
- Heavy Equipment Operator, Michigan Army National Guard, March 1991-Present
- Truck Mechanic, Woodland International, May 2003-Present
- Heavy Equipment Mechanic Internship, Louis Padnos Iran and Metal Company, May 2002-August 2002
- Truck Driver, Doug Weiler Trucking Company, November 1995-November 2001
- Truck Driver, Deuling Milk Haulers, November 1994-January 1999
- Foreman, Great Lakes Barn Restoration, Hesperia, MI April 1994-Present
- Salesman, Quality Stores Inc., Fremont, MI, November 1991-March 1994

Joseph H. Strohkirch

Education
B.S. Heavy Equipment Service Engineering Technology, Ferris State University, 2003
A.A.S., Heavy Equipment Technology, Ferris State University, 1999

Other Training
- Troubleshooting and Maintaining the Macintosh
- Advanced Macintosh Troubleshooting Clinic
- Leviton Cabling Systems Certification

Honors and Activities
- Dean's List
- Outstanding Student, College of Technology, Heavy Equipment Technology 1995/96

Work Experience
- Ferris State University, Big Rapids, MI
    - *Lab Technician*, College of Business Computer Labs, September 1996-Present – Maintain, repair and configure computers and peripheral equipment including 95/98 workstations, Macintosh workstations, Appleshare servers and NT servers. Administrate an Appleshare file server, an NT server including DHCP and IIS services and an At-Ease security server. Configure network software to allow for TCP/IP, Appletalk and Novel Netware service. Train other student technicians and lab employees to provide better customer service. Coordinate software installations and upgrades with program coordinators and advise faculty regarding hardware and software changes.
    - *Telecommunications Technician (Student Supervisor)*, Department of Telecommunications, January 1996-June 1998 – Installed and repaired network cabling and hardware including Category 5, Category 3, Thin-net, token ring, broadband and fiber optic cabling. Connect ATM segments, subnets, T-1s and workstation to various network components. Installed network card readers for security access, time clocks and cash registers. Installed telephone cabling for fax machines, digital and analog telephones and modems. Helped layout and specify cabling locations and components for infrastructure wiring and upgrades. Trained new telecommunications technicians and card reader operators.
    - *Mechanic, Motor Pool*, August 1995-December 1995 – Repaired and maintained campus vehicles and equipment, including gasoline, diesel hydraulic and electrically powered equipment.
- *Cook, Delivery Driver & Waiter*, Pizza King, Big Rapids, MI August 1994-August 1997
    - Supervised and coordinated the kitchen help, delivery drivers and waiters and filled in whenever needed.
- *Maintenance Mechanic*, Peacock Industries, Summer of 1993 & 1994
    - Maintained trucks, cars, forklifts, cranes, welders and various tooling machines. Clerk in the shipping/receiving department. Packaged products loading and unloading. Drove trucks.

Timothy M. Yearling

Education

BS, Heavy Equipment Service Engineering Technology, Ferris State University, Big Rapids, MI, 2004
AAS, Heavy Equipment Technology, Ferris State University, Big Rapids, MI, 2004
Auto/Diesel Technology Certificate, Branch Area Career Center, Coldwater, MI, 2000

Achievements

- Member, Golden Key International Honor Society
- Honors Student, Ferris State University Honors Program
- State certified –
    - Heavy Duty Brakes and Braking Systems
    - Heavy Duty Suspension and Steering
    - Heavy Duty Drive Lines
    - Heavy Duty Engine Repair
    - Automotive Brakes and Braking Systems
- 4th Place Winner, National SkillsUSA-VICA Diesel Equipment Technology Post-Secondary Competition
- Gold Medalist, State SkillsUSA-VICA Diesel Equipment Technology Post-Secondary Competition
- Silver Medalist, State SkillsUSA-VICA Diesel Equipment Technology High School Competition

Work Experience

- Product Training Assistant, Eaton Corporation Truck Components Operations North America, Galesburg, MI, May 2003-August 2003
    - Prepared training curriculums
    - Revised existing training programs
    - Assisted in the gathering of training materials, produced and distributed same
    - Performed demonstrations
    - Assisted with Kenworth certified dealer training
- Lab Assistant, Ferris Sate University Academic Support Center, Big Rapids, MI, August 2003-December 2003
    - Set-up laboratory exercises
    - Assisted students in laboratory exercises
    - Performed demonstrations
    - Maintained equipment inventory
- Head Technician, Ferris State University Katke Golf Course, Big Rapids, MI 2002-2004
    - Diagnosed and repaired grounds keeping equipment
    - Performed preventative maintenance on all equipment
    - Performed failure analysis on failed machinery components
    - Tracked parts orders & inventory
    - Rebuilt components

Section 10. Enrollment trends over the past 5 years of since the last review

In 2001 the Heavy Equipment Technology programs had their highest combined enrollment numbers of over ten years – 127 students. This was seven over the capacity of the programs. Currently we have eighty-two students enrolled in the HET programs.

The sequence of events that have negatively affected enrollment in the Heavy Equipment Technology programs are:

In 2001 the Heavy Equipment Department made curriculum revisions to offer an industry internship instead of service floor lab practice. Rumors circulated that the change from service floor lab practice to an industry internship was due to low student enrollment.

Fact:

1. Curriculum revisions were implemented at a peak enrollment.
2. Throughout the semester fifty percent of the Service Floor is utilized by other HEQT/HSET courses.
3. Faculty overload pay was reduced by $8,000 - $10,000 and tuition dollars were increased by $7,000.
4. One year after implementation of the curriculum revisions, the total student enrollment of the HEQT/HSET programs was down by five, calculated over a five year period.
5. Faculty productivity – HEQT program was at its second highest in five years.
6. Faculty productivity- HSET degree was at its highest in five years.
7. Because of the curriculum revisions the Department's S&E expenses increased by $8,000 - $10,000; however, the changes also saved and increased revenues by a minimum of $15,000.
8. Dean's office has not increased S&E budget funding.

Rational for implementing the curriculum revisions were:

1. Increase the number of hands-on hours and the quality of technical experience for our students.
2. Improve/increase program contacts with industry.
3. Improve productive use of the service floor area.
4. Increase faculty productivity.

Present enrollment with a fall and winter entry point: Sixty-one students are enrolled in the HEQT – A.A.S. degree program and twenty-one students are enrolled in the HSET –

BS degree program. This means the HET programs are operating at approximately 68% efficiency...or 32% below capacity. This is a serious problem at a time when there is a serious shortage of qualified heavy equipment technicians are not available on a state and a national level and also, when Ferris State University has a need for additional operational revenue.

Ferris State University's Heavy Equipment Technology programs are considered to be the best in the nation by industry and the graduates are in high demand. There are four to five job offers per heavy equipment student graduate.

Low enrollment is one of the most critical challenges to be faced by Ferris, the College of Technology, the Heavy Equipment Technology Department and the industries served by the program. Steps are being taken to address this crucial issue and will be explained in detail in the Marketing portion of this review.

Enrollment

	Fall 1999	Fall 2000	Fall 2001	Fall 2002	Fall 2003
Tenure Track FTE	7	7	7	7	5.2
Overload/Supplemental FTEF	2	2	2	1	1/2
Adjunct/Clinical FTEF (unpaid)					
Enrollment on-campus total*	93	107	109	95	82
Freshman	28	34	25	23	20
Sophomore	25	31	22	26	23
Junior	25	23	28	20	18
Senior	15	19	23	26	21
Masters					
Doctoral					
Pre-Tech Students	15	23	18	11	11
Enrollment off-campus					
Traverse City					
Grand Rapids					
Southwest					
Southeast					

Section 11. Program productivity/cost

Ferris State University
Degree Program Costing 2001- 2002 (Summer, Fall, and Winter)

College : Technology
Department : Heavy Equipment

Program Name: Heavy Equipment Technology AAS

Program Credits Required (Total credits to graduate) 68

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$182.46
**Department Cost per Student Credit Hour	$78.37
***Dean's Cost per Student Credit Hour	$14.32
Total Cost per Student Credit Hour (Average for program)	**$275.15**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$12,407.41
Total Program Department Cost	$5,329.00
Total Program Dean's Cost	$973.59
Total Program Cost (Assumes a student will complete program in one year)	**$18,710.01**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
CULTELE	E	$1,788,247	$327,581	$166,368	20412	$88	$16	$8	3	$263	$48	$24
ENGL150	L	$541,076	$115,001	$53,060	6594	$82	$17	$8	3	$246	$52	$24
ENGL211	L	$62,991	$9,627	$4,442	552	$114	$17	$8	3	$342	$52	$24
HEQT100	L	$25,774	$9,569	$1,311	82	$314	$117	$16	2	$629	$233	$32
HEQT101	L	$25,774	$8,636	$1,183	74	$348	$117	$16	2	$697	$233	$32
HEQT110	L	$21,825	$19,139	$2,621	164	$133	$117	$16	4	$532	$467	$64
HEQT120	L	$11,876	$3,734	$511	32	$371	$117	$16	4	$1,484	$467	$64
HEQT160	L	$36,822	$15,404	$2,110	132	$279	$117	$16	4	$1,116	$467	$64
HEQT193	N	$13,999,928	$3,907,592	$1,989,040	91943	$152	$43	$22	4	$609	$170	$87
HEQT200	L	$25,791	$15,638	$2,142	134	$192	$117	$16	2	$385	$233	$32
HEQT201	L	$20,883	$14,471	$1,982	124	$168	$117	$16	4	$674	$467	$64
HEQT210	L	$29,517	$15,871	$2,174	136	$217	$117	$16	4	$868	$467	$64
HEQT230	L	$35,235	$16,338	$2,237	140	$252	$117	$16	4	$1,007	$467	$64
HEQT240	L	$35,235	$18,205	$2,493	156	$226	$117	$16	4	$903	$467	$64
HEQT270	L	$30,751	$18,672	$2,557	160	$192	$117	$16	4	$769	$467	$64
HEQT271	N	$13,999,928	$3,907,592	$1,989,040	91943	$152	$43	$22	4	$609	$170	$87
MATH116	L	$171,103	$18,058	$14,742	1832	$93	$10	$8	4	$374	$39	$32
PHYS130	L	$24,571	$12,114	$4,442	552	$45	$22	$8	4	$178	$88	$32
PSYC150	L	$273,911	$93,946	$34,400	4275	$64	$22	$8	3	$192	$66	$24
WELD146	L	$20,163	$7,922	$1,215	76	$265	$104	$16	2	$531	$208	$32

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

Ferris State University
Degree Program Costing 2001- 2002 (Summer, Fall, and Winter)

College : Technology
Department : Heavy Equipment

Program Name: Heavy Equipment Serv Eng Tech/Mfg opt BS (Yrs 3 & 4)

Program Credits Required (Total credits to graduate) 68

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$121.17
**Department Cost per Student Credit Hour	$53.59
***Dean's Cost per Student Credit Hour	$13.74
Total Cost per Student Credit Hour (Average for program)	**$188.50**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$8,239.67
Total Program Department Cost	$3,644.38
Total Program Dean's Cost	$934.06
Total Program Cost (Assumes a student will complete program in one year)	**$12,818.11**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
COMM221	L	$94,607	$14,330	$8,015	996	$95	$14	$8	3	$285	$43	$24
CULTELE	E	$1,788,247	$327,581	$166,368	20412	$88	$16	$8	3	$263	$48	$24
ECON221	L	$199,515	$49,185	$38,654	2349	$85	$21	$16	3	$255	$63	$49
ENGL311	U	$144,190	$19,882	$9,173	1140	$126	$17	$8	3	$379	$52	$24
ETEC140	L	$58,324	$17,578	$7,048	441	$132	$40	$16	3	$397	$120	$48
HSET393	U	$9,989	$7,002	$959	60	$166	$117	$16	4	$666	$467	$64
HSET400	U	$14,844	$10,270	$1,406	88	$169	$117	$16	4	$675	$467	$64
HSET403	U	$25,925	$21,940	$3,005	188	$138	$117	$16	4	$552	$467	$64
HSET460	U	$16,203	$7,002	$959	60	$270	$117	$16	4	$1,080	$467	$64
ISYS105	L	$246,900	$113,969	$49,564	3012	$82	$38	$16	3	$246	$114	$49
ISYS305	U	$60,932	$14,416	$6,270	381	$160	$38	$16	3	$480	$114	$49
MATH126	L	$124,397	$12,026	$9,817	1220	$102	$10	$8	4	$408	$39	$32
MATL240	L	$59,004	$25,703	$8,055	504	$117	$51	$16	4	$468	$204	$64
MECH340	U	$79,603	$28,380	$11,379	712	$112	$40	$16	4	$447	$159	$64
MFGE352	U	$6,543	$2,958	$927	58	$113	$51	$16	2	$226	$102	$32
MGMT301	U	$228,218	$43,974	$34,655	2106	$108	$21	$16	3	$325	$63	$49
PDET312	U	$4,214	$1,594	$639	40	$105	$40	$16	2	$211	$80	$32
PDET412	U	$3,477	$5,580	$2,237	140	$25	$40	$16	2	$50	$80	$32
PHYS211	L	$157,275	$34,411	$12,617	1568	$100	$22	$8	4	$401	$88	$32
PLSC311	U	$16,765	$5,406	$1,979	246	$68	$22	$8	3	$204	$66	$24
SURE331	U	$7,121	$10,992	$1,534	96	$74	$114	$16	3	$223	$343	$48

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

Ferris State University
Degree Program Costing 2001- 2002 (Summer, Fall, and Winter)

College : Technology
Department : Heavy Equipment

Program Name: Heavy Equipment Serv Eng Tech/Maint opt BS (Yrs 3 & 4)

Program Credits Required (Total credits to graduate) 68

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$141.66
**Department Cost per Student Credit Hour	$52.99
***Dean's Cost per Student Credit Hour	$14.70
Total Cost per Student Credit Hour (Average for program)	**$209.35**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$9,633.17
Total Program Department Cost	$3,603.08
Total Program Dean's Cost	$999.51
Total Program Cost (Assumes a student will complete program in one year)	**$14,235.75**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
ACCT201	L	$284,487	$51,258	$40,283	2448	$116	$21	$16	3	$349	$63	$49
BLAW301	U	$61,817	$15,347	$12,095	735	$84	$21	$16	3	$252	$63	$49
COMM221	L	$94,607	$14,330	$8,015	996	$95	$14	$8	3	$285	$43	$24
CULTELE	E	$1,788,247	$327,581	$166,368	20412	$88	$16	$8	3	$263	$48	$24
ECON221	L	$199,515	$49,185	$38,654	2349	$85	$21	$16	3	$255	$63	$49
EHSM330	U	$36,002	$6,153	$2,862	78	$462	$79	$37	2	$923	$158	$73
ENGL311	U	$144,190	$19,882	$9,173	1140	$126	$17	$8	3	$379	$52	$24
HSET393	U	$9,989	$7,002	$959	60	$166	$117	$16	4	$666	$467	$64
HSET400	U	$14,844	$10,270	$1,406	88	$169	$117	$16	4	$675	$467	$64
HSET401	N	$13,999,928	$3,907,592	$1,989,040	91943	$152	$43	$22	4	$609	$170	$87
HSET402	U	$14,094	$5,602	$767	48	$294	$117	$16	4	$1,175	$467	$64
HSET460	U	$16,203	$7,002	$959	60	$270	$117	$16	4	$1,080	$467	$64
ISYS105	L	$246,900	$113,969	$49,564	3012	$82	$38	$16	3	$246	$114	$49
MATH126	L	$124,397	$12,026	$9,817	1220	$102	$10	$8	4	$408	$39	$32
MATL240	L	$59,004	$25,703	$8,055	504	$117	$51	$16	4	$468	$204	$64
MECH340	U	$79,603	$28,380	$11,379	712	$112	$40	$16	4	$447	$159	$64
MGMT301	U	$228,218	$43,974	$34,655	2106	$108	$21	$16	3	$325	$63	$49
PHYS211	L	$157,275	$34,411	$12,617	1568	$100	$22	$8	4	$401	$88	$32
PLSC311	U	$16,765	$5,406	$1,979	246	$68	$22	$8	3	$204	$66	$24
SURE331	U	$7,121	$10,992	$1,534	96	$74	$114	$16	3	$223	$343	$48

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

Section 12. Conclusions on the data presented

a) Centrality to FSU mission
b) Uniqueness and visibility
c) Service to the state and nation
d) Demands by the students
e) Quality of instruction
f) Demand for graduates
g) Placement rate and average salary of graduates
h) Service to non-majors
i) Facilities and equipment
j) Library information resources
k) Faculty: professional and scholarly activities
l) Administration effectiveness

a) Centrality to FSU mission

Mission of Ferris State University

Ferris State University will be a national leader in providing opportunities for innovative teaching and learning in career-oriented, technological and professional education.

The Heavy Equipment Technology Department's mission and goals are central to the Ferris mission statement.

Mission of the Heavy Equipment Technology Department

To educate technically skilled leaders for the heavy equipment industry.

Goals of the Heavy Equipment Technology Department

1. Merge the Maintenance & Repair and the Manufacturing options of the four-year BS degree program
2. Assist AEDF to become recognized as a national accrediting organization for post-secondary heavy equipment technology programs.
3. Develop and implement ideas that would market and "showcase" the Heavy Equipment Technology program and the heavy equipment industry.
4. To investigate and identify new and future technology within each industry served by the Heavy Equipment Technology program and to develop a plan for the systematic replacement of old and obsolete lab equipment, machinery and tools.
5. Develop a plan for the systematic replacement of retiring faculty and for hiring additional faculty as program enrollment increases.
6. To investigate and identify new and future technology within each industry served by the Heavy Equipment Technology program and to develop a plan to provide training for the faculty to upgrade their skills and knowledge in the areas of their specific responsibilities.
7. Acquire additional sources of income for the Heavy Equipment Technology Department.

b) Uniqueness and visibility

The Heavy Equipment Technology A.A.S. and the Heavy Equipment Service Engineering Technology BS degree programs are unique to the heavy equipment industry, Michigan and the United States. The Heavy Equipment Technology A.A.S. program was implemented in 1959 as a certificate program and has evolved to one of the top rated programs in the country. Up to two years the Heavy Equipment Technology program at Ferris was the only heavy equipment left in Michigan and up to five years ago Ferris was ***the only*** public university that offered a heavy equipment program in the Midwest. The Heavy Equipment Service Engineering Technology program is ***the only*** technical Heavy Equipment bachelor's degree program in the United States.

For years our students have been recognized as major contenders at the National SkillsUSA-VICA competition, Diesel Equipment Technology. For six out of the last nine

years of competition, our A.A.S. students have placed in the top four. Three of the six years Ferris Heavy Equipment students captured first place. Our students compete against an average of thirty-five competitors from other states, many of whom are not post-secondary students but are employees in the heavy equipment industry. For over twenty-five years the Heavy Equipment Technology Department has hosted the Michigan SkillsUSA-VICA competition for Diesel Equipment Technology.

The HET program is accredited by the North Central Association of Colleges and Schools. The Heavy Equipment Technology program at FSU was the first in the nation to be accredited by the Associated Equipment Distributors Foundation (AEDF). AEDF is the only organization recognized by the heavy equipment industry to accredit post-secondary heavy equipment programs. The HET program is also Automotive Service Excellence (ASE) Master Certified for Medium and Heavy Duty Truck through the National Automotive Technicians Education Foundation (NATEF).

c) Service to the state and nation

The Heavy Equipment Technology A.A.S. degree program and the Heavy Equipment Service Engineering BS degree program have had a very positive impact. For years the heavy equipment industry has benefited from the quality of our graduates. Ferris' HET programs is recognized as a leader with our graduates from the HEQT and HSET programs working in all areas throughout Michigan, the United States and around the world.

Students from Botswana, South Africa, Malaysia, India, the Caribbean Islands, Ethiopia, Morocco and Angola have taken advantage of the HEQT and HSET programs. The government of Botswana has made the HEQT and HSET programs their number one choice for their heavy equipment students. Fourteen students from Botswana have graduated from the HET programs and are now holding key positions of supervision in maintaining the nation's heavy equipment fleet to develop its infrastructure and economy.

d) Demands by the students

In 2001 the Heavy Equipment Technology programs had their highest combined enrollment numbers of over ten years – 127 students. This was seven over the capacity of the programs. Currently we have eighty-two students enrolled in the HET programs.

The sequence of events that have negatively affected enrollment in the Heavy Equipment Technology programs are:

In 2001 the Heavy Equipment Department made curriculum revisions to offer an industry internship instead of service floor lab practice. Rumors circulated that the change from service floor lab practice to an industry internship was due to low student enrollment.

Fact:

9. Curriculum revisions were implemented at a peak enrollment.
10. Throughout the semester fifty percent of the Service Floor is utilized by other HEQT/HSET courses.
11. Faculty overload pay was reduced by $8,000 - $10,000 and tuition dollars were increased by $7,000.

12. One year after implementation of the curriculum revisions, the total student enrollment of the HEQT/HSET programs was down by five, calculated over a five year period.
13. Faculty productivity – HEQT program was at its second highest in five years.
14. Faculty productivity- HSET degree was at its highest in five years.
15. Because of the curriculum revisions the Department's S&E expenses increased by $8,000 - $10,000; however, the changes also saved and increased revenues by a minimum of $15,000.
16. Dean's office has not increased S&E budget funding.

Rational for implementing the curriculum revisions were:

5. Increase the number of hands-on hours and the quality of technical experience for our students.
6. Improve/increase program contacts with industry.
7. Improve productive use of the service floor area.
8. Increase faculty productivity.
9. Students gain work experience on state-of-the art equipment.
10. Students gain *real* work experience instead of simulated work experience in a lab environment.

Present enrollment with a fall and winter entry point: Sixty-one students are enrolled in the HEQT – A.A.S. degree program and twenty-one students are enrolled in the HSET – BS degree program. This means the HET programs are operating at approximately 68% efficiency…or 32% below capacity. This is a serious problem at a time when there is a serious shortage of qualified heavy equipment technicians are not available on a state and a national level and also, when Ferris State University has a need for additional operational revenue.

Ferris State University's Heavy Equipment Technology programs are considered to be the best in the nation by industry and the graduates are in high demand. There are four to five job offers per heavy equipment student graduate.

Low enrollment is one of the most critical challenges to be faced by Ferris, the College of Technology, the Heavy Equipment Technology Department and the industries served by the program. Steps are being taken to address this crucial issue and will be explained in detail in the Marketing portion of this review.

e) Quality of instruction

The Heavy Equipment Technology A.A.S. degree program and the Heavy Equipment Service Engineering BS degree program have had a very positive impact. For years the heavy equipment industry has benefited from the quality of our graduates. Ferris' HET programs is recognized as a leader with our graduates from the HEQT and HSET

programs working in all areas throughout Michigan, the United States and around the world.

Students from Botswana, South Africa, Malaysia, India, the Caribbean Islands, Ethiopia, Morocco and Angola have taken advantage of the HEQT and HSET programs. The government of Botswana has made the HEQT and HSET programs their number one choice for their heavy equipment students. Fourteen students from Botswana have graduated from the HET programs and are now holding key positions of supervision in maintaining the nation's heavy equipment fleet to develop its infrastructure and economy.

f) Demand for graduates

Graduates from the A.A.S. and the BS degree heavy equipment programs are in high demand.

- 100% job placement – four to five job offers per graduate
- Graduate and Advisory Committee follow-up surveys:
  - Ability to advance into upper level management/leadership positions
  - Transferable skills in a varied job market

g) Placement rate and average salary of graduates

100% job placement with excellent benefits

A.A.S. graduates – $35,000

BS Graduates – $45,000

h) Service to non-majors

The impact of service courses offered by the Heavy Equipment Technology Department has provided students enrolled in Product Design Engineering Technology, Automotive Engineering Technology, Automotive Service Technology and Automotive & Heavy Equipment Management programs the opportunity to acquire additional knowledge of related industries. Acquiring additional knowledge and developing a wider range of transferable skills will our graduates to be more competitive in today's varied and highly competitive job markets.

The following Heavy Equipment Technology courses have been made available to the programs listed above:

- HEQT 110 Electronic Fundamentals
- HEQT 120 Heavy Duty Engine Technology
- HEQT 160 Fluid Power Fundamentals
- HEQT 230 Diesel Fuel System Technology
- HEQT 282 A.C. Electrical Power Generation
- HEQT 285 Generator Control & Switch Gear
- HSET 300 Failure Analysis
- HSET 302 Fleet Management
- HSET 403 Testing Systems and Analysis

i) Facilities and equipment

The Heavy Equipment Center has approximately 57,000 square feet of floor space. Approximately 37,000 square feet is available for instructional purposes. The instructional space is composed of combined lecture/labs, auditorium and a service floor area. The service floor area accounts for 10,000 of the 37,000 square feet. Even though the facility is of excellent design for teaching heavy equipment technology, it was designed to accommodate pre-1975 heavy equipment vehicles and instructional units. Today's heavy equipment vehicles incorporate more electronics and computers in the control of electrical, fuel, power train and hydraulic systems. This additional technology requires more instructional space than was required in previous years.

All lecture/labs can accommodate a maximum of one piece of mobile equipment for demonstration. When lecture/labs are used by more than one instructor, which is usually the case, there is not enough lab space in the rooms to accommodate all the necessary instructional equipment. Mainly for this reason curriculum revisions were proposed and implemented in 2001 to offer a summer internship (HEQT 193) instead if Heavy Equipment Lab Practice (HEQT 275).

The Heavy Equipment Technology Department has between thirty-five and forty heavy equipment vehicles which are used for demonstration and lab exercises. About twenty-five of the pieces are used continually in a variety of courses. The overall condition of the equipment is acceptable. Over the past five years the Heavy Equipment Technology Department has received over $500,000 in donated equipment and instructional units. The challenge is to continue to acquire equipment and instructional units to address the new and evolving technology.

The Heavy Equipment Technology Department needs to acquire new and additional equipment and instructional units to address the new and evolving technology. The Department especially needs more up-to-date construction and agricultural equipment and instructional units. The Department also needs to do a better job of advertising the Electrical Power Generation Certificate program.

j) Library information resources

The Ferris Library for Information, Technology and Education (FLITE) is a multifaceted, complex organization designed to serve the needs of the students of Ferris State University, the faculty and staff and the community at large. We provide access through various channels to information necessary to the success of our students.

The library has a budget that is divided among the 120 or so programs that are offered at Ferris, and books, periodicals and electronic databases are purchased both for specific programs and for the student body at large. Over the last few years, the Heavy Equipment Program has had a budget of approximately $1,000 per year. We have purchased as many books and periodicals as we can afford, along with a number of specific databases, one mainly for the College of Technology, the Applied Science and Technology Abstracts database.

Recently we purchased access to Dieselnet.com, a full text database that deals just with diesel engines and components. This database is accessible to anyone from on-campus at

any time. This came from the request of one of the newest faculty members in the program. We also have purchased or have database access to over 90 journals dealing with various aspects of heavy equipment technology. Some of the databases we provide our students include the Applied Science and Technology Abstracts Index (some full-text); Wilson SelectPlus (full-text); InfoTracOne (full-text) and other general use databases.

For those articles to which we do not have direct access (bound periodicals, microfiche, electronic full-text, etc.) we provide interlibrary loan service at no charge to our students. With the improvement in technology, these articles are often available within four days of request.

The library also provides access to a number of specialized computer programs for College of Technology students. These include AutoCAD 2004 and Mechanical Desktop 2004 power pack. All of the computers in the library provide access to Microsoft Office Suite to assist students in writing papers and presentations.

Library instruction is also available to all heavy equipment technology students upon request of the faculty member. General library instruction and specialized database/Internet training is also available.

The library has depository status for U.S. government documents, the U.S. Patent and Trademark Office and the State of Michigan. These agencies provide both tangible (paper-based, microfiche, etc.) and electronic access to publications of the various agencies and offices. Some 34,000 electronic resources are available through our online public access catalog. Many of these are government documents of one sort or another.

The library also provides extended study hours to assist students who must work and/or have other commitments during the normal work day.

Resources Relating to the Heavy Equipment Industry Available at FLITE

AIHA Journal	Aerosol Science & Technology
Alternative Sources of Energy	ASTM Standardization News
Automotive Engineer	Automotive Engineering International
Automotive Industries	Automotive News
Biotechnology Progress	Catalysis Reviews
Chemical & Engineering News	Chemical Engineering Progress
Chemical Innovation	Chemical Market Reporter
Chemistry and Industry	Chemistry and Technology of Fuels and Oils
Civil Engineering	Combustion, Explosion and Shock Waves
Combustion Science and Technology	Control Engineering
Diesel equipment superintendent	Diesel power
Diesel progress	Diesel progress engines & drives
Diesel progress North American	Energy
Energy & Fuels	Energy Conversion and Management
Entergy Engineering	Energy Sources

The Engineer	Engineering and Mining Journal
ENR	Environmental Health Perspectives
Experimental Mechanics	Experimental Techniques
Hart's Diesel Fuel News	Harts E&P
High Energy Chemistry	High Temperature
Highway & heavy construction	Highway & heavy construction products
Hydraulics & Pneumatics	Hydrocarbon Processing
IEEE Control Systems Magazine	IEEE Spectrum
IEEE Transactions on Energy Conversion	IEEE Transactions on Industrial Electronics
ITE Journal	Industrial & Engineering Chemistry Research
Interavia, Business & Technology	International Journal of Engine Research
International Journal of Heat and Mass Transfer	International Journal of Knowledge-based and Intelligent Engineering Systems
Journal of Automobile Engineering	Journal of Catalysis
Journal of Chemical and Engineering Data	Journal of Construction Engineering and Management
Journal of Energy Resources Technology	Journal of Engineering for Gas Turbines and Power
Journal of Heat Transfer	The Journal of Physical Chemistry A
Journal of Physics. D, Applied Physics	Journal of the American Oil Chemists' Society
Journal of the Electrochemical Society	Journal of the Institute of Energy
Machinery Lubrication	Manufacturing Engineering
Mass Transit	Mathematical and Computer Modeling of Dynamical Systems 8
Measurement Science & Technology	Mechanical Engineering
Mechanical Systems and Signal Processing	Michigan roads and construction
Mining Engineering	Modern Bulk Transporter
National Petroleum News Market Facts	Petroleum Science and Technology
Physical Chemist Chemical Physics	Power Engineering
Proceedings of I MECH E Part D of Automobile Engineering	Proceedings of the I MECH E Part I Journal of Systems & Control Engineering
Proceedings of the Institution of Mechanical Engineers. Part A, Journal of Power and Energy	Proceedings of the Institution of Mechanical Engineers. Part D, Journal of Automobile Engineering
Public Works	Refrigerated Transporter
Research Technology Management	Sensor Review
The Shock & Vibration Digest	Tech Directions
Tooling & Production	Topics in Catalysis
Traffic World	Trailer/Body Builders
Transportation & Distribution	Transmission & distribution world
Transmission digest: TD	Transportation Quarterly
Transportation Research. Part A, Policy and Practice	Transportation Research. Part B, Methodological
Transportation Research. Part D, Transport & Environment	Tribology & Lubrication Technology
Tribology Transactions	Ward's Auto World

k) Faculty: professional and scholarly activities

All faculty qualifications meet or exceed qualifications for program accreditation/certification. The faculty of the HEQT and the HSET programs has been stable in the past. In 1998 there were seven faculty members – Ken Acton, Keith Cripe, William Hillary, Bruce Jacobs, John Shaltry, and John Strohkirch. Gary Sievert was hired in 1998. In the last four years considerable change has occurred in the Department's composition due to retirements. Faculty members who retired were:

Ken Acton	Fall 2000
William Hillary, John Shaltry & Gary Sievert	Fall 2003
Bruce Jacobs	Summer 2004

Jerry Zmyslowski was hired in the fall of 2001. Gary Maike and Darren Wilson were hired in the fall of 2004. All three are full time tenure track faculty.

In 2003 adjunct faculty were used to fill the empty positions. Adjunct faculty members were Ken Anderson, David Cloud, Douglas Ginnever, Bradley Stitt, Joseph Strohkirch and Timothy Yearling.

The current faculty consists of two tenured faculty members – Keith Cripe with thirty-five years and John Strohkirch with twenty years and the three full time tenure track faculty listed above and one adjunct faculty, Douglas Ginnever.

The faculty have years of industry work experience. The tenured faculty have years of teaching experience while the tenure track faculty have had various teaching experiences. The faculty has teaching responsibilities in the A.A.S. and BS degree programs and the Electrical Power Generation Certificate program.

l) Administration effectiveness

Adequacy of resources and department efficiency:

Industry support for our department has been excellent. In the past four years over $500,000 of in-kind donations have been made to the Heavy Equipment Department by the dealers and manufacturers of heavy equipment. Donations have included instructional units and components along with testing, diagnostic, troubleshooting and data collection software.

Department support by upper-level administration has been minimal. In 2001 the Heavy Equipment Technology Department initiated curriculum changes which increased faculty productivity, reduced faculty overloads and increased tuition income for Ferris State University. Additional S&E funding required to support the changes was not supported by the administration. An additional $9,000 is required to purchase, build and maintain classroom instructional units. Additional funds are also required for faculty training and updating.

In the past three years the Heavy Equipment Technology Department has been successful in applying for and receiving over $8,000 in funding. These funds were used to attend workshops, national committee meetings and support of our students competing in national competitions. Also, over the past five years income from the Transportation Institute has generated over $50,000 which helped support the Heavy Equipment Technology Department.

Are class and teaching schedules efficient

Course offerings and teaching schedules are efficient. In the past four years the Heavy Equipment Technology Department has implemented curriculum revisions for both the two and four-year programs. Curriculum revisions reduce faculty overloads and provide the students the opportunity to earn a certificate in Electrical Power Generation.

Needs of the Department

1. Develop departmental operational policies, procedures, rule and regulations. These need to be developed by the department faculty in cooperation with the COT Dean's office so there will not be a conflict between departmental mission, goals and objectives and those of the Dean's office as well as the University.
2. Define scope of work and authority for department chair(s): The department chair's scope of work at the present time is totally unrealistic in what can or should be accomplished. In addition, the authority the department chair has over the operation of the department is non-existent. This can be a particularly "sticky" situation because the department chair is a member of the union as are the faculty. The lack of a realistic scope of work and a lack of clearly defined authority creates an environment for crisis management. Operational chaos at the departmental/college level is the end result. This issue must be addressed and an agreement reached by the union and the university itself.

Section 13. Recommendations

Proposed Marketing Plan:

1. Marketing of the Heavy Equipment Technology programs will be expanded to target math and science students in public and private high schools throughout Michigan. The technology incorporated in today's heavy equipment industry requires a solid background in math and science and makes these students perspective candidates for the program.
2. Improve communications with equipment manufacturers and dealers. The heavy equipment industry needs to get more involved with recruiting/sponsoring students for our program..."Grow Your Own" philosophy.
3. Because the Heavy Equipment Service Engineering Technology program is the only BS degree of its kind in the United States, marketing for our BS degree program will be expanded to include all two-year heavy equipment associate degree programs throughout the United States, specifically focusing on A.A.S. programs accredited by the Associate Equipment Distributors Foundation (AEDF).
4. Out of state tuition should be waived for students from an approved AEDF school or at least the reciprocity agreement should be considered because Ferris State's Heavy Equipment Technology program is the educational model used by AEDF for accrediting schools in the United States.
5. Marketing materials will be developed to market the Heavy Equipment Technology A.A.S. program to inform students in post-secondary and career centers of the following:
    - the range of career opportunities available in the heavy equipment industry
    - the reason why a student should continue into the four-year BS degree program
6. Marketing materials will be developed to market the Heavy Equipment Service Engineering Technology BS degree program and will emphasize the need for obtaining a four year degree to cope with new and evolving technology and the people skills required to move into upper level management.
7. Better utilize the resources available through Ferris State's University Advancement and Marketing office to develop and produce high quality marketing materials.
8. Show a presence, either in person or via written materials, at high schools, career centers, vo-tech centers and community colleges to better market the Heavy Equipment Technology programs at Ferris State University.
9. Assist AEDF to become recognized by State of Michigan Office of Career and Technical Preparation as an accrediting organization for secondary and post-secondary heavy equipment technology programs. Office of Career and Technical Preparation Contact: Patricia Talbot-Dills, phone 517.335.0359.

Integrate Curriculums:

Investigate the opportunities of integrating courses taught in the Heavy Equipment Technology programs with departments or programs to develop new certificate/degree programs. These new certificate/degree programs will provide the FSU COT graduates the opportunity to develop a wide range of transferable skills for today's varied job market. Examples include:

1. HSET 410 – Interactive Electronic Controls could be integrated with surveying (GPS)
2. HEQT 285 – Electrical Power Generation could be integrated with electronics (Homeland Security initiatives)