SELF STUDY FOR ACADEMIC PROGRAM REVIEW

MANUFACTURING ENGINEERING TECHNOLOGY
BACHELOR OF SCIENCE PROGRAM

College of Engineering Technology
Ferris State University
Big Rapids, Michigan 49307

August 30, 2016

Program Review Panel

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Program Name and History

The Manufacturing Engineering Technology BS program at Ferris State University owes its very existence to one man: J. Edward Nicks, a long-time engineering manager in the automotive industry with Chrysler Corporation. Standard practice in process planning departments used to be to hire graduates of mechanical or industrial engineering programs and to train them to do manufacturing engineering work (process design rather than product or system design). In the early 1970’s, Ed recognized that a body of knowledge for process design existed, and that it was of sufficient mass to warrant its own field of study at the college level.

Ed was of course aware of Ferris State College and our fine reputation for producing technically-talented graduates of numerous associates programs. After a mostly unsuccessful search to see if any university was providing students the kind of bachelor-level experiences he wanted new hires to have (Brigham Young University in Provo, Utah came the closest), he proposed a 2-year program at the college junior and senior levels, to be built upon a foundation of any of Ferris's associate degree programs that related to manufacturing (Drafting/Tool Design, Welding, Machine Tool, Plastics, Mechanical). Ed presented the proposal to the School of Technology's dean in 1974, and the resultant 2 year AAS + 2 years manufacturing course work = BS degree in Manufacturing Engineering Technology became the first of Ferris’s many 2+2 degrees in engineering technology. We enrolled our first class of 14 students in 1976, and two years later, in May of 1978, all 14 of those pioneers comprised the first MFGE graduating class, with multiple job offers each. That trend continues today.

Over the past 40 years, the MFGE program has played and continues to play many roles for the Ferris State University community. It is still a ***cornerstone*** of the College of Engineering Technology, as the original BS program in engineering technology. It is the ***wellspring*** from which many of Ferris' other most popular programs have flowed, with the Plastics Engineering Technology BS program in 1982, Welding Engineering Technology BS program in 1984, Product Design Engineering Technology BS program in 1988, and the Quality Engineering Technology BS program in 1997 (since folded back into the MFGE program) all beginning as specialized areas of concentration under the MFGE umbrella. It is an ***originator*** in many ways; for instance, reaching out to the continuing education student market by being the first (1984) and still most popular Ferris program offered at night in Grand Rapids, garnering a state grant to provide a new metal stamping option via distance learning technology directly to industrial sites (the first in the College to do so on both counts), and offering certificate programming both on- and off-campus simultaneously. It is a ***trendsetter***, having inspired copycat programs at nearby schools such as Grand Valley State University, Western Michigan University, and Central Michigan University, as well as feeder programs at numerous community colleges through the state. It is an ***innovator***, having been the first (and to date one of the few) College of Engineering Technology programs to have three of its courses designated as writing-intensive. It is an ***enabler***, consistently placing its graduates in the top five on the list of starting salaries by not only getting graduates good jobs, but getting them a choice of good jobs, with over 85% still in Michigan and contributing back to the state. It is the ***taproot*** that steadies and nourishes numerous other programs within the department, college, and university by providing service courses on basic and advanced manufacturing topics. And, so far, all of this has been accomplished with a minimum of marginal investment in facilities, equipment, and personnel.

From the very beginning, those wishing to enter our program must already have an associate degree (or equivalent) in a manufacturing related program from Ferris or another college. To this experience we add (depending upon specific courses taken) 39 credits of MFGE-major courses plus a 4-credit internship, 8 credits of related technical coursework, 8 credits in math and science, and 12 general education credits, some directed. A few of the other unique aspects of the current Ferris MFGE curriculum vs. other school's programs include:

- the concentration on production process planning rather than systems engineering common to other manufacturing programs. Where other, more mechanical engineering-oriented schools teach their students to be able to make one of anything, we go beyond that, teaching our students to be able to make many of anything, and to do it the most economical way possible.
- three MFGE-prefixed courses are designated by the University as writing-intensive. Our students hone their written communication skills on directed assignments within their field of study
- the number of group projects and technical presentations the students are responsible for in the space of only two years. There is at least one major term project and presentation due every semester, with several cross-course projects and one that combines the efforts of both juniors and seniors.

As long as there are consumer products to be made, someone will need to figure out the one best way to produce them. Hence, the need for manufacturing engineers will remain regardless of where production occurs.

Program Mission

In broad strokes, a program's mission statement helps guide program decision-making and allows program stakeholders a clear understanding of where the program stands, who they serve, and where they strive to be. A program's mission should fit with the mission of the department in which they reside, the college, and Ferris State University.

Include the FSU mission statement.

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

Include the College mission statement.

The College of Engineering Technology prepares our graduates to be leaders who help / enable / industry and professional services successfully compete in a global economy.

Include the Program mission statement.

FSU MFGE Mission: "The mission of the Manufacturing Engineering Technology Program is to prepare career-ready manufacturing engineering professionals to serve Michigan, and the nation in a global economy."

Incorporating the Mission.

O How is the program mission statement aligned with the mission of the department, college and the university?

The program goals support the University's.

O How is the program's mission incorporated into decisions impacting the program (including curricular changes?)

The course content includes tools that are specifically used in manufacturing environments in all industries. Students complete projects meant to simulate actual manufacturing projects in teams as done in industry. Any curriculum changes are viewed through current industry trends and desired skill sets.

O What policies or procedures are in place to monitor the program's mission and its relationship to the department, college and university?

The department consults with our industrial advisory board to review our mission and curriculum against the current industrial skill set needs. All faculty and some student representatives attend the meeting. All MFGE faculty perform site visits for interns and meet with supervisors to get feedback on student development and future needs.

O How does the program further the department, college, and university missions?

The MFGE department has several innovative teaching and learning models. Many classes are taught in small groups to mimic industrial environment. Major projects span multiple classes. Whenever practical classes tour local manufacturing facilities to apply in an industrial environment the tools discussed in the classroom. Our graduates achieve 100% placement and excellent reviews from employers in regards to "hitting the ground running" and very little need for guidance.

Program Goals

Clearly defined goals are an integral part of program success. Program goals help direct faculty and administrative decision -making in the areas of enrollment, research, faculty development, program curriculum, and the like.

Describe what the program hopes to accomplish.

O Include program goals.

1. Continue enrollment trend that has maximized the department at capacity (30 students). This will allow us to increase entry requirements to produce an even higher quality graduate.

2. Improve faculty use of various software packages in the classroom and curriculum development, for example, Microsoft Excel, Solidworks, and TracDat.
3. Improve implementation of modern automation in various class settings. Provide a lab for hands on experiential learning to supplement classroom discussion.
4. Complete the refurbishment of the Swan annex (machine shop and classrooms) to enhance recruiting and the student experience.

O How do the described goals apply to preparing students for professional careers, responsible citizenship, lifelong learning, and meeting employer needs or the needs of other stakeholders?

If we have better students coming in, better exposure to software commonly used in industry, hands on experience in machining and automation in a refurbished building it seems obvious that the students would be better prepared for their career.

Incorporating program goals

O How are the program's goals communicated to students, faculty, and other stakeholders?

Through faculty meetings, industrial advisory board meetings, and student/faculty interactions such as the Society of Manufacturing Engineers (SME) meetings.

O How and when are the program's goals reviewed and re-evaluated?

During faculty meetings and industrial advisory board meetings.

Goal Attainment

O Evaluate the program's success in achieving the stated program goals.

We're doing very well.

O How does the program plan to address both met goals (reflection) and goals not realized (action?)

Our last goal was to get to full enrollment; we have achieved that. The next goal was to improve our labs and our ability to offer increased hands-on activities to enhance the student's learning experience; a $30,000,000 refurbishment plan has been approved by the State of Michigan and Ferris State University.

Curriculum

*Note – present check sheets and syllabi as an appendix to this document or as a hyperlink only. Do not include copies directly within this section.

Curriculum

O Link to program check sheets.

A copy of the MFGE check sheet is included in Appendix C.

O Link to syllabi for program courses.

The committee has included the syllabi for the three-course capstone experience for our students (MFGE 411, MFGE 421, and MFGE 422) in Appendix C. These syllabi should give a good sense of the format and information included in the typical MFGE syllabus. If more syllabi than those are required they can be provided by the department secretary.

O Evaluate program policies and procedures implemented to ensure quality, consistency, and currency related to content within each course within the program.

All instructors and adjuncts are expected to follow the outline for each class. Any departures are typically discussed among the interested faculty and suitable compromises are arranged. Changes are included in an updated syllabus.

O Evaluate general education requirements, co-curricular experiences, and service-learning or other experiential education experiences incorporated into the curriculum.

Our current curriculum satisfies all of the new requirements for general education such as collaboration and problem solving.

O How is the importance of general education requirements, co-curricular experiences, and service-learning or other experiential education experiences communicated to potential students, currently enrolled students, and other stakeholders?

The general education requirements are clearly shown on the checksheet and are reviewed with the students during the admission process and during advising meetings.

O How are program requirements communicated to potential students, currently enrolled students, and other stakeholders?

The program requirements are clearly shown on the checksheet and are reviewed with the students during the admission process and during advising meetings.

O Evaluate curricular changes that have been implemented in the last five years.

Per the provost's request, the Quality Engineering degree was reconstituted as a Quality concentration within MFGE. Additionally, a Quality Leadership certificate was created which is a collaborative effort between Manufacturing and the School of Business.

O Evaluate curricular changes currently under consideration.

Only one change is being considered at this time. MFGE 326 – Tolerancing Charting may be eliminated as a class and the content incorporated into other existing classes. This may allow us to make MFGE 354 – Lean Manufacturing a requirement for graduation.

O Evaluate program policies and procedures implemented to ensure quality, consistency, and currency of the curriculum

They work well, we have 100% placement with high salaries.

Assessment of Student Learning

A primary goal of quality programs is student employability and continued learning beyond the classroom and graduation. It is critical for continued program growth and quality to have a full understanding of what the program wants graduates to be, to know, and to be able to do.

The purpose of assessment is to inform continuous improvements designed to enhance students' learning and success. Beyond goals related to student achievement, assessment of student learning is a university-wide requirement from the Higher Learning Commission accrediting body. The pertinent criteria states:4.B The institution demonstrates a commitment to educational achievement and improvement through ongoing assessment of student learning.

1. Programs have clearly stated goals for student learning and effective processes for assessment of student learning and achievement of learning goals.
2. Programs assess achievement of the learning outcomes.
3. Programs use the information gained from assessment to improve student learning.
4. Programs processes and methodologies to assess student learning reflect good practice, including the substantial participation of faculty and other instructional staff members.

This section gives programs an opportunity to identify and evaluate established program-level learning outcomes, how the program measures accomplishment of established outcomes, and how results are used to make program improvements.

Program -level Student Learning Outcomes

O Include program-level student learning outcomes (that is, when a student graduates from the program, what should they know, be like, and be able to do?)?

These are the program level student learning outcomes:

1. Industrial engineering skills.
2. Quality skills.
3. Professional development.
4. Employable skills.
5. Collaboration.
6. Problem solving.
7. Process skills.

O Identify and evaluate the assessment measures that are used to gauge overall student success in accomplishing established program-level learning outcomes (for example -capstone assignment, internship evaluation, national examination pass rates, etc.)

These outcomes are assessed using a variety of measurable. These include the evaluations from MFGE 393 Internship class, capstone assignments in MFGE 411, 421, and 422, and the junior level capstone class which is MFGE 324. Collaboration, problem solving, and process skills are included throughout the breadth of the program. Employable skills are verified by our outstanding placement rate.

The four column report is included in Appendix E.

O Identify and evaluate program policies and procedures designed to formalize the process of establishing, monitoring, and updating program-level student learning outcomes.

Student learning outcomes are reviewed during faculty meetings on an as-needed basis.

*Note –present TracDat information as an appendix to this document or as a hyperlink only. Do not include copies of TracDat information directly within this section.

O Link to a curricular map outlining how program outcomes are addressed throughout the curriculum.

Our curricular map is included in Appendix E.

O What assistance from the University would be valuable in the establishment, monitoring, and reporting of program-level student learning outcomes?

The MFGE program is working to incorporate our TracDat results into our continuous improvement process. At this time, the assistance from the University has been adequate. Our focus for the last few years has been on enrollment and boosting our numbers in the program. Now that our enrollment numbers are strong we will focus on fully implementing TracDat.

Program Profile

Unless specifically noted, programs are to report only official enrollment and other program profile numbers obtained from Institutional Research and Testing. It is important that official numbers be used as this allows for consistent comparison within and between programs. Data requested within each section bellow should be presented in table form with analysis immediately following. For the data requested in the section below, use the data contained in the document "Applications, Admissions, and Enrolled" supplied by Institutional Research and Testing.

*Note programs scheduled to undergo review will be provided this document by IR & T no later than December 31 following the August APR orientation.

•Apps, Admits, and Enrolled

Five Year Summary of Applicants and Admits for MFGE								
TERM	COLLEGE	MAJOR	MAJR_DESC	DEGC CODE	CAMPUS	APPLIED	ADMITTED	ENROLLED
201508	TE	MFGE	Manufacturing Engineering Tech	BS	ON	9	3	3
201508	TE	MFGE	Manufacturing Engineering Tech	BS	OFF	14	13	10
201408	TE	MFGE	Manufacturing Engineering Tech	BS	ON	8	3	2
201408	TE	MFGE	Manufacturing Engineering Tech	BS	OFF	15	14	11
201308	TE	MFGE	Manufacturing Engineering Tech	BS	ON	8	3	*
201308	TE	MFGE	Manufacturing Engineering Tech	BS	OFF	12	9	*
201208	TE	MFGE	Manufacturing Engineering Tech	BS	ON	8	3	*
201208	TE	MFGE	Manufacturing Engineering Tech	BS	OFF	19	15	*
201108	TE	MFGE	Manufacturing Engineering Tech	BS	ON	4	3	*
201108	TE	MFGE	Manufacturing Engineering Tech	BS	OFF	14	11	*
	*Enrolled was reported for 2014 and 2015, but not in earlier years.							

O Report the number of applications to the program over the past five years.

O Report the number admitted to the program over the past five years.

O Report the number enrolled into the program over the past five years.

O Evaluate the overall “apps, admits, and enrolled” trends within the program.

This data table is based only on students that apply from other colleges (per Mitzi Day). Any students that transfer from feeder programs (such as MFGT (our largest), or CDTD, etc.) are not included in these counts. It is clear that Big Rapids has admitted fewer transfer students as the main feeder program, Manufacturing Tooling Technology, has increased its enrollment. Grand Rapids continues to admit all of the students as transfers, mostly from GRCC and then scattered among other schools.

•Enrollment-Headcounts

Term		On-campus	Off-Campus	On-Line	Total
2009	Freshman	0	0	0	0
	Sophomore	1	1	0	2
	Junior	8	13	0	21
	Senior	28	30	0	58
	Masters	0	0	0	0
	1st Professional	0	0	0	0
				Total	81
2010	Freshman	1	0	0	1
	Sophomore	0	2	0	2
	Junior	7	9	0	16
	Senior	21	32	0	53
	Masters	0	0	0	0
	1st Professional	0	0	0	0
				Total	72
2011	Freshman	0	0	0	0
	Sophomore	0	0	0	0
	Junior	13	7	0	20
	Senior	19	30	0	49
	Masters	0	0	0	0
	1st Professional	0	0	0	0
				Total	69
2012	Freshman	0	0	0	0
	Sophomore	1	1	0	2
	Junior	5	9	0	14
	Senior	20	35	0	55
	Masters	0	0	0	0
	1st Professional	0	0	0	0
				Total	71
2013	Freshman	2	0	0	2
	Sophomore	0	1	0	1

	Junior	6	8	0	14
	Senior	14	42	0	56
	Masters	0	0	0	0
	1st Professional	0	0	0	0
				Total	73

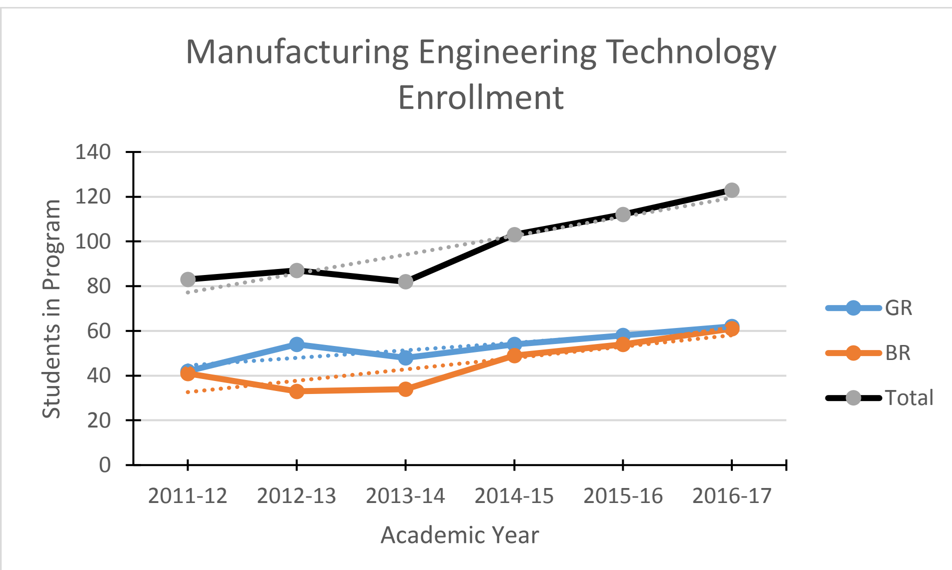
O Report the number of on-campus students enrolled in the program over the past five years.

O Report the number of off-campus students enrolled in the program over the past five years.

O Report the number of fully online students enrolled in the program over the past five years.

O Report the total number of students enrolled in the program.

	GR	BR	Tot
2011-12	42	41	83
2012-13	54	33	87
2013-14	48	34	82
2014-15	54	49	103
2015-16	58	54	112
2016-17	62	61	123



The data received from IR &T seems disconnected from the reality of our program counts. Consequently we will not use this data. In an effort to generate representative data individual class lists of "program only students" were used to determine enrolled, one junior level and one senior level. We believe the transfer nature of our program, both internal and external, along with a pre-manufacturing designation make it difficult to get accurate data from IR & T regarding these and applicant/admittance numbers. The enrolled data generated thru class lists will best reflect students who actually were active and taking classes in the program, so only they will be discussed.

Examination of the enrollment graph above indicate a 50% increase in total enrollment since the 2011/2012 academic year. As you can see the enrollment at both campuses mirror each other in numbers and trend. During the automotive industry crash and restructuring many skilled trades, toolmakers, production workers, die makers etc. lost their jobs or took significant pay cuts. This body of workers is representative of the parents of our many of prospective students. This combined with the media drumbeats of the death of manufacturing in the U.S. created a significant down turn in opinion for manufacturing and consequently our program. However, this was contrary to the demand of industry for "hit the ground running" manufacturing engineers our program produces. Our placement seen throughout the worst of the downturn remained high at virtually 100%. The positive trend shown is attributed to an upswing in the economy and manufacturing jobs creating a more positive view of our program along with continued recruitment efforts to a more receptive audience.

Over the period shown high school and vocational education teachers were visited. It's felt that by utilizing these instructors as "at the source recruiters" was the most time/cost effective way to recruit. Each high school instructor speaks to many more students in a given year than we can and they already have an ongoing relationship with them consequently their recommendations have a lot of weight. To maintain our relationship we do presentations regarding our program and manufacturing in general. Instructors appreciate these as it helps them to recruit lower level students into their classes and programs, which helps fill our pipeline of prospective students. Each year we have visited on average 8-10 high schools/voc-ed centers. We additionally for the recruitment of non-traditional students have attended every Grand Rapids Community College/Ferris state open house for recruitment.

O Evaluate the ideal number of enrolled students given the available faculty, physical resources, and other present limitations or requirements. Provide a complete explanation as to how the number presented was determined.

For Big Rapids, optimal number is 30 enrolled juniors and 30 enrolled seniors. For Grand Rapids, the optimal starting cohort is 15. The Big Rapids number matches the enrollment cap in many of our classes to create acceptable student/faculty ratio. In Grand Rapids, the cohort number is set lower because there is less equipment (labs are shared with GRCC), physical class room sizes are smaller, and faculty must travel from Big Rapids to support the program. Also, cohorts are combined in certain classes to enhance productivity.

O If the current number of enrolled students is less than the ideal number, outline program plans to increase student enrollment.

The data provided only includes through 2013. However, for Fall 2015 and Fall 2016, the program achieved capacity.

If the current number of enrolled students is equal to or greater than the ideal number, answer the following:

Evaluate the determination that the program is at or has exceeded capacity in relation to stated programs goals and strategic plan(s).

We've met our goal of capacity. Now we would like to increase the enrollment requirements while maintaining capacity.

Evaluate the option of increasing student enrollment in relation to stated program goals, program strategic plan(s), and current and projected market conditions. What resources (faculty, staff, space, equipment, etc.) would be required to increase enrollment?

More faculty, space, classrooms, and equipment would be required. The current building refurbishment was done to enhance our current capabilities and does not consider program expansion for increased enrollment.

O Evaluate the overall “enrollment –headcounts” trends within the program.

It’s good, our enrollment has continued to increase since about 2008 until now where we are at capacity. Nice job, MFGE program.

O How does the program address “enrollment –headcounts” trends within the program (general) and how will the program address “enrollment –headcounts” trends reported (specific)?

Headcounts are reviewed at faculty meetings, faculty are involved in recruitment activities. We also discuss enrollment during the industrial advisory board meeting.

For the data in the section below, use the data contained in the documents “Productivity Reports” available at the following LINK

•Student Credit Hour Trends

O Report the summer, fall, spring, and fall plus spring (F + SP) student credit hours generated over the past five years.

		Student Credit Hours			
Department	year	Summer	Fall	Spring	F + SP (a)
Manufacturing Eng Tech	2010-11	294	2283	1960	4243
	2011-12	200	2173	1621	3794
	2012-13	212	2417	1958	4375
	2013-14	208	2868	2114	4982
	2014-15	268	3068	1630	5698

O Evaluate overall “student credit hour” trends within the program.

It’s good. The MFGE faculty teaches a lot of credit hours for our major and also support courses for other majors.

O How does the program address “student credit hour” trends within the program (general) and how will the program address “generated student credit hours” trends reported (specific).

Student credit hour trends are reviewed at faculty meetings and during the industrial advisory board meeting.

•Productivity

O Report the summer, fall, spring, and fall plus spring (F + SP) SCH/FTEF for the last five years.

		SCH/FTEF			
Department	year	Summer	Fall	Spring	F + SP (a/b)
Manufacturing Eng Tech	2010-11	80.55	232.14	183.81	413.99
	2011-12	77.61	247.63	172.45	417.49
	2012-13	120.45	251.86	169.67	413.97
	2013-14	87.39	251.14	189.6	441.47
	2014-15	140.31	251.94	221.13	476.58
	2015-16	*	354.07	275.03	629.10

*Summer results not reported as not all grades are posted yet for the term.

O Report the summer, fall, spring, and fall plus spring (F + SP) SCH/FTEF for the most recent year.

We added the results for 2015-16 in the last row of the table above. The committee calculated these values from data provided by Institutional Research.

O Report the University average SCH/FTEF.

For 2014-15 the University average is 460.26. The average for CET is 429.34.

O Evaluate overall "productivity" trends within the program including how the program SCH/FTEF compares with the University average.

Our program outperforms the college and university averages. We're doing really well.

O How does the program address "productivity" trends within the program (general) and how will the program address "productivity" trends reported (specific).

Our focus is on student success by providing opportunity to be enrolled in all the classes that they need. We allow overloads in our classroom providing the class is suitable for that number of students. We do not focus on productivity trends.

For the data requested in the section below, use the data contained in the document "Academic Program Review Enrollment by Residency, Age, FSU GPA & ACT" at the following LINK

•Enrollment –Residency

Term	Resident	Midwest Compact	Non-Resident	Avg. Age	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
200908	77	2	1	28	3.2	1.86	4	20.28	14	30
201008	69	1	2	29	3.17	2.02	4	20.83	14	30
201108	67	0	2	30	3.23	1.98	4	21.45	17	30
201208	69	1	1	30	3.19	1.73	4	20.06	15	26
201308	71	1	1	31	3.24	1.55	4	20.84	16	27

O Report the number of enrolled students from Michigan (“resident”) and the number enrolled from out-of-state (“non-resident”) over the past five years.

O Report the average age of enrolled students over the past five years.

O Report the average GPA of enrolled students over the past five years.

O Report the average ACT of enrolled students over the past five years.

O Evaluate overall “enrollment –residency” trends within the program.

Our program enrollment reflects our recruiting efforts which are focused in state.

O How does the program address “enrollment –residency” trends within the program (general) and how will the program address “enrollment –residency” trends reported (specific).

We don’t focus on this aspect of enrollment.

For the data requested in the section below, use the data contained in the document “Academic Program Review Enrollment by Sex & Ethnicity” at the following LINK

•Enrollment –Gender and Ethnicity

O Report the number of enrolled students by gender over the past five years.

Gender

Term	Enrolled	Male	Female
200908	81	79	2
201008	72	71	1
201108	69	65	4
201208	71	67	4
201308	73	70	3

O Report the number of enrolled students by ethnicity over the past five years.

Term	Enrolled	Unknown	Black	Hispanic	Native	Asian	White	Hawaiian	Multi	Foreign
200908	81	4	1	2	1	0	72	0	0	1
201008	72	4	0	3	1	0	62	0	0	2
201108	69	3	1	4	1	0	58	0	0	2
201208	71	2	1	2	1	2	32	0	0	1
201308	73	1	0	2	0	2	67	0	0	1

O Report the number of full time and part time students over the past five years.

Full/Part Time

Term	Enrolled	Full Time	Part Time
200908	81	35	46
201008	72	30	42
201108	69	29	40
201208	71	24	47
201308	73	19	54

O Evaluate overall “enrollment –gender and ethnicity” trends within the program.

The engineering discipline is historically male dominated. As for ethnicity, the MFGE program is color blind and welcomes students that apply of all origins.

O How does the program address “enrollment –gender and ethnicity” trends within the program (general) and how will the program address “enrollment –gender” trends reported (specific)?

These are common issues across all technical schools. Our faculty group along with the entire CET has not been able to solve these, nor has anyone else.

For the data requested in the section below, use the data contained in the document “Academic Program Review Graduates” at the following LINK

For the data requested in the section below, use the data contained in the document “Retention and Graduation Rates” report supplied by Institutional Research and Testing.

*Note programs scheduled to undergo review will be provided this document by IR & T no later than the end of December following the August APR orientation.

• Retention

O Report the percentage of students who chose to enroll in a second year in the program after having completed their first (AKA –“first year retention”) over the last five years.

*Note -this number can be found under the “Year 2” heading labeled as “% Still Enrolled In...”

				Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
200608	MFGE	1							
			% Graduated By	0	0	0	0	0	0
			% Still Enrolled In	0	0	0	0	0	0
			% Persisters	0	0	0	0	0	0
			% Non-Persisters	100	100	100	100	100	100
201308	MFGE	2							
			% Graduated By	0	50				
			% Still Enrolled In	100	50				
			% Persisters	100	100				
			% Non-Persisters	0	0				

O Evaluate overall “retention” trends within the program.

The data in this table is based on First Time in any College (FTIAC, as explained by Mitzi Day). Since the MFGE program is a +2 program we never have any FTIAC students so this data will never report any retention rate for our program. This table is meaningless to our analysis but is included here only to show that we have the data and have looked at it.

O How does the program address “retention” trends within the program (general) and how will the program address “retention” trends reported (specific).

We do not have meaningful data for “retention” so we do not address it in any way.

•Program Graduates

O Report the number of program graduates from the Big Rapids campus over the last five years.

O Report the number of program graduates from off campus over the last five years.

O Report the number of fully online program graduates over the last five years.

Graduate Headcount

Academic Year	On-Campus	Off-Campus	On-Line	Total
2008-2009	18	6	0	24
2009-2010	16	5	0	21
2010-2011	18	15	0	33
2011-2012	17	10	0	27
2012-2013	15	8	0	23

O Evaluate overall “program graduates” trends within the program.

Our graduation numbers reflect our enrollment. When enrollment goes up, we get more graduates about 2 years later.

For the data requested in the section below, use the data contained in the document “Retention and Graduation Rates” report supplied by Institutional Research and Testing.

• Six Year Graduation Rate

O Report the percentage of students initially enrolled in the program who either graduates from the program itself or from another FSU program over the past five years.

*Note – this number can be found under the “Year 7” heading labeled as “% Persisters.”

				Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
200608	MFGE	1							
			% Graduated By	0	0	0	0	0	0
			% Still Enrolled In	0	0	0	0	0	0
			% Persisters	0	0	0	0	0	0
			% Non-Persisters	100	100	100	100	100	100
201308	MFGE	2							
			% Graduated By	0	50				
			% Still Enrolled In	100	50				
			% Persisters	100	100				
			% Non-Persisters	0	0				

O Evaluate overall "six year graduation rate" trends within the program.

The data in this table is based on First Time in any College (FTIAC, as explained by Mitzi Day). Since the MFGE program is a +2 program we never have any FTIAC students so this data will never report any graduation rate for our program. This table is meaningless to our analysis but is included here only to show that we have the data and have looked at it.

O How does the program address "six year graduation rate" trends within the program (general) and how will the program address "six year graduation rate" trends reported (specific).

We do not have meaningful data for "six year graduation rate" so we do not address it in any way.

For the data requested in the section below, use the data contained in the document "Administrative Program Review Graduates Average GPA" at the following LINK

•Graduate Average GPA

O Report the average FSU GPA of program graduates over the past five years.

		Graduate GPA	
Year	Average GPA	Min. GPA	Max. GPA
2008-2009	3.25	2.23	3.94
2009-2010	3.14	2.15	3.89
2010-2011	3.22	2.22	3.96
2011-2012	3.21	2.20	3.83
2012-2013	3.10	2.28	3.68

O Evaluate overall "graduate average GPA" trends within the program.

The average GPA for our students is over a 3.00, which includes all of the core classes as well as gen-eds. This reflects well on our program.

O How does the program address “graduate average GPA” trends within the program (general) and how will the program address “graduate average GPA” trends reported (specific).

Our focus on recruiting students with higher academic credentials should positively affect this number in the future.

For the data requested in the section below, use the data contained in the document “Administrative Program Review Graduates Average ACT” and “Academic Program Review Enrollment by Residency, Age, FSU GPA & ACT” at the following LINK

• Graduate Average ACT

O Report the average ACT of program graduates for the last five years.

Year	Average ACT	Min. ACT	Max. ACT
2008-2009	19.46	17	28
2009-2010	20.27	15	29
2010-2011	20.78	14	24
2011-2012	22.00	17	30
2012-2013	19.93	15	26

O How does the program address “graduate average ACT” trends within the program (general) and how will the program address “graduate average ACT” trends reported (specific).

Our focus on recruiting students with higher academic credentials should positively affect this number in the future.

• State and National Examinations

O Report the percentage of program graduates who pass state or national certification or licensure examinations.

There are no such exams for Manufacturing Engineering graduates. So no data has been collected for this issue.

O Report the national average pass rates and compare program graduate pass rates to the national average.

N/A

O Evaluate overall “state and national examinations” trends within the program.

N/A

O How does the program address “state and national examinations” trends within the program (general) and how will the program address “state and national examinations” trends reported (specific)?

N/A

Program Value beyond Productivity and Enrollment Numbers

Programs offer value (aka "productivity") to Ferris State University beyond what enrollment, student credit hours, and full-time equated faculty numbers oftentimes show. This section gives programs an opportunity to highlight all the difficult-to-measure contributions the program makes to the benefit of its department, college, the community, and Ferris State University.

•Program Value beyond Enrollment Numbers

O Highlight the positive impacts the program has on the department, college, and university that extend beyond enrollment, student credit hour, and other 'hard' measures of program success.

The MFGE program offers nontraditional students in Grand Rapids the chance to earn a technical bachelor's degree. They would not have that opportunity while working if not for our program. The MFGE program in Big Rapids supports many of the Registered Student Organizations (RSO's) that need parts fabricated, such as the Baja Team, Formula One Team, etc.

Program Flexibility and Access

It is important for (ultimate) program success to be flexible and accessible to the largest number of potential students. This section provides programs an opportunity to describe how program offerings are available to the largest segment of potential students.

• Flexibility and Access

O Report the number of offsite locations.

One.

O Report the online availability of program offerings.

None.

O Report options for evening or weekend classes.

The entire program to earn the MFGE degree is offered on a part-time, evening schedule for working adults.

O Report options for accelerated program completion.

None.

O Report options for summer program offerings.

Summer classes are offered in Grand Rapids as part of the standard program plan. Big Rapids students are able to register for these classes. Big Rapids students normally take an internship class during their summer term.

O Describe any multi entry points available for students entering the program.

Students can begin the program at the beginning of any term after they have completed their entry requirements.

O How does the program address "flexibility and access" within the program?

Our program is structured to provide access to traditional and non-traditional students such as working adults. Students enrolled in either program can take courses offered at either location to assist with scheduling.

Visibility and Distinctiveness

This section provides programs an opportunity to benchmark itself against competitive institutions. In addition, programs can highlight unique program features and identify plans for improvement based on the results of their analysis.

•Visibility and Distinctiveness

O Highlight unique program features and benefits that provide a competitive advantage over competing programs.

FSU is unique because we are the only school in Michigan to offer an Engineering Technology degree in Manufacturing. That's important because 95% of all of our students are from Michigan. Our program offers a unique blend of theory with hands-on application, as opposed to the traditional engineering (theoretical based) programs. The machine shop with associated labs and projects provide hands-on application of class room topics.

Another unique quality is he Grand Rapids program which is offered completely at night for working adults. This is a significant percentage of the program enrollment. No other programs that we compete with offer a night time option.

O Evaluate program policies and procedures designed to market and promote unique program features and benefits.

Faculty actively recruit at high schools and vocational ed centers. On-line content is used to illustrate the strengths of the program via videos, pictures, and the program web page.

•Competitive Programs

O Identify and describe competing programs.

We have no competing programs in Engineering Technology. Some schools that offer traditional engineering programs include Western Michigan, Grand Valley, Central Michigan, to name a few. These programs are traditional engineering programs which place their primary focus on the engineering fundamentals; math, physics, chemistry, statics, dynamics, etc.

O Evaluate competing program's features, benefits, or other modes of operation that represent a competitive advantage over FSU's program.

We see no competitive advantage. Our students are not drawn to those types of programs that are heavily based on theory and mathematics such as a traditional engineering program would be.

O What features, benefits, or other areas of competitive advantage can be emulated from competing programs that would improve the program at FSU?

The other schools have nicer facilities, including classrooms and lab spaces.

O Outline specific plans for program improvement based on analysis of competing programs.

Money has been approved at the state level to improve the Swan Annex to include enhanced machining lab and classroom spaces.

• Preeminent Program

O Identify and describe the preeminent program in the country similar to the program at FSU.

We see ourselves as the preeminent program in Manufacturing Engineering Technology.

Demand

• Demand

O Why do students enrolled in the program choose FSU?

q1 How elect to come to FSU

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Internet	11	24.4	24.4	24.4
	Visit from Ferris representative	5	11.1	11.1	35.6
	High School Counselor	1	2.2	2.2	37.8
	Other family attended	8	17.8	17.8	55.6
	Other	20	44.4	44.4	100.0
	Total	45	100.0	100.0	

This questions was included in our survey of current students and the answers are summarized in the table above. The internet leads the way, followed by other family members having attended. The summary of the "Other" category includes suggestions from a variety of other sources that we did not include, such as instructors at community colleges, friends, and other miscellaneous sources.

O Would students enrolled in the program choose the program at FSU if they had to do it over again?

No data was collected for this question.

O Would students enrolled in the program recommend the program at FSU to others?

q2f MFGE program: I feel comfortable referring the program to others.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	4.4	4.4	4.4
	Somewhat Disagree	1	2.2	2.2	6.7
	Somewhat Agree	12	26.7	26.7	33.3
	Strongly Agree	30	66.7	66.7	100.0
	Total	45	100.0	100.0	

These results from our survey show that slightly more than 93% of the students would recommend our program to others. That seems pretty good.

O Evaluate the projected market outlook for demand for program graduates.

Summary

Quick Facts: Industrial Engineers	
2015 Median Pay	$83,470 per year $40.13 per hour
Typical Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2014	241,100
Job Outlook, 2014-24	1% (Little or no change)
Employment Change, 2014-24	2,100

This data is clipped from the website of the United States Department of Labor. They predict "little or no change" in the outlook for Industrial Engineers (this is the closest category to our program). This conflicts with the outlook in the West Michigan area as reported by our Industrial Advisory Board members. They claim that more engineers will be needed to combat the effects of low wage companies moving jobs to off shore locations. Only be improving efficiencies, processes, and methods will U.S. manufacturing continue to compete in the global marketplace and these improvement areas are the typical province of the Manufacturing Engineer.

O Would alumni choose the program at FSU if they had to do it over again?

No data was collected for this question.

O Would alumni recommend the program at FSU to others?

q8 Recommend the Mfg Eng Tech program to relative or friend

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	25	100.0	100.0	100.0

The data table above is taken from our survey of graduates. It shows that 100% of graduates would recommend the program to others.

O What do alumni say about the continued demand for program graduates?

No data was collected for this question.

O What do faculty teaching within the program say about the continued demand for program graduates?

No data was collected for this question.

O What do advisory board members say about the continued demand for program graduates?

q14 Best estimate for growth potential for Mfg Engineers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Steady	2	50.0	66.7	66.7
	Increase	1	25.0	33.3	100.0
	Total	3	75.0	100.0	
Missing	0	1	25.0		
Total		4	100.0		

The consensus of this very small sample is that the demand for MFGE graduates will be steady or will increase.

O Evaluate overall "demand" trends within the program.

Demand for Manufacturing Engineers and Quality Engineers has been strong for the last 5 years and we project it will stay strong for the foreseeable future due to retirement of "baby-boomers" already in technical positions and also the increased need for more technical workers in the manufacturing field.

Employability of Graduates

A key indicator of the overall success of a program is the quality of employment enjoyed by graduates. This section gives programs an opportunity to outline key indicators of the quality and availability of work for students after graduation.

The university's annual graduate-follow-up report can be a quality source of information for completing this section. Contact Institutional Research and Testing LINK

•Employment Post-Graduation

O Report the number and percentage of program graduates employed in their field of study one year post-graduation.

MANUFACTURING ENGINEERING TECH									
Basic CNC Prog & Machine Operations	4			4	2	50%	0	0%	NA
Industrial Practices	3			3	1	33%	0	0%	NA
Industrial Technology & Management			9	9	3	33%	3	100%	$ 86,000
Manufacturing Engineering Tech			20	20	5	25%	5	100%	$ 69,075

O Report the number and percentage of program graduates employed full time in their field of study overall.

q3 Currently employed in the Mfg or Quality field

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	25	100.0	100.0	100.0

O Report the number and percentage of program graduates employed part time in their field of study overall.

No data collected for this.

O Report the number and percentage of program graduates employed outside their field of study one year post-graduation.

No data collected for this.

O Report the number and percentage of program graduates employed outside their field of study overall.

No data collected for this.

O Report the number and percentage of program graduates accepted to graduate school one-year post graduation.

No data collected for this.

O Report the number and percentage of program graduates accepted to graduate school overall.

No data collected for this.

O Report the average yearly salary for program graduates who have graduated from the program within the last three years.

q14 Approximate annual salary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	$50,001-$60k	6	24.0	24.0	24.0
	$60,001-$70k	6	24.0	24.0	48.0
	$70,001-$80k	5	20.0	20.0	68.0
	$80,001-$90k	5	20.0	20.0	88.0
	$90,001 or more	2	8.0	8.0	96.0
	Prefer not to respond	1	4.0	4.0	100.0
	Total	25	100.0	100.0	

A weighted average using the median of each range and the Frequency column can be estimated at $71,250.

•Stakeholder Perceptions of the Employability of Graduates

O Report alumni perceptions of the program's ability to prepare graduates for a career in their field of study.

q6h Preparation for employment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	1	4.0	4.0	4.0
	Somewhat Satisfied	10	40.0	40.0	44.0
	Very Satisfied	14	56.0	56.0	100.0
	Total	25	100.0	100.0	

We have a high level of satisfaction, 24/25 respondents were satisfied or better, with the majority very satisfied. No respondent selected the lowest option of "Very Dissatisfied."

O Report advisory board perceptions of the program's ability to prepare graduates for a career in their field of study.

q7 How prepared for employment are FSU grads

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Prepared	2	50.0	50.0	50.0
	Very Prepared	2	50.0	50.0	100.0
	Total	4	100.0	100.0	

q8 Would hire FSU grads in the future

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Probably Yes	1	25.0	25.0	25.0
	Definitely Yes	3	75.0	75.0	100.0
	Total	4	100.0	100.0	

We had a very low response rate from employers. However, those that did respond feel our graduates are prepared and they would hire our grads in the future. No respondent selected the two lowest options of "Very Unprepared" and "Somewhat Unprepared" so those choices are not shown in the tables above.

O Evaluate career assistance opportunities available to students.

The MFGE faculty work with the students to prepare their resume starting in fall term of their junior year. We also work with the students to prepare an interview portfolio which contains examples of their work. We pass contact information and inquiries from prospective employers for interns and permanent positions.

Faculty Composition and Engagement

Academic, work, and other accomplishments of faculty have a direct positive impact on overall program quality. A fully engaged faculty in all dimensions of teaching, research, and service is vital for student success. This section gives programs an opportunity to highlight current faculty accomplishments.

•Organization

O Report the number of tenure-line or tenured faculty teaching within the program.

6

O Report the number of tenure-line or tenured faculty teaching the majority of their load on the Big Rapids campus.

6

O Report the number of tenure-line or tenured faculty teaching the majority of their load in off-campus locations.

Zero, but two faculty teach about 50% of their load at the Grand Rapids campus.

O Report the number of tenure-line or tenured faculty teaching the majority of their load fully online.

0

O Report the number of full-time temporary faculty teaching within the program.

0

O Report the number of full-time temporary faculty teaching the majority of their load on the Big Rapids campus.

0

O Report the number of full-time temporary faculty teaching the majority of their load in off-campus locations.

0

O Report the number of full-time temporary faculty teaching the majority of their load fully online.

0

O Report the number of adjunct faculty teaching within the program.

4

O Report the number of adjunct faculty teaching the majority of their load on the Big Rapids campus.

0

O Report the number of adjunct faculty teaching the majority of their load in off-campus locations.

4

O Report the number of adjunct faculty teaching the majority of their load fully online.

0

Curriculum Vitae

O Report the name, highest degree earned, and average semester load for all tenure-line and tenured faculty.

Name	Highest Degree Earned	Avg. Sem. Load (Credit Hours)	Avg. Sem. Load (SCH)
James Rumpf	Masters Electrical Engineering	8.4	189
Mark Rusco	Masters Business Administration	13.6	288.5
Blaine Danley	Masters Metallurgical and Materials Engineering	12.8	496.9
Joseph Wist	Masters Metallurgical Engineering	12.8	317.2
Mark Dunneback	Masters Management Sciences	13.2	368.5
Nathan Leatherman	Masters Mechanical Engineering	14.5	357.5

The values above are calculated from load data provided by the dean's office for the past six years. The values for Jim Rumpf appear low because he has had one-half release time for acting as FFA President. On average, all faculty are in overload. It is also remarkable to note that Blaine Danley averages more than 900 SCH per year.

O Report the name, highest degree earned, and average semester load for all full-time temporary faculty.

N/A

O Report the name, highest degree earned, and average semester load for all adjunct faculty.

Name	Highest Degree Earned	Avg. Semester Load (Credit Hours)
Hank Bonnah	Masters	1.5
Brent Nienhuis	Masters	1.5
Mike Fick	Bachelors (pursuing Masters)	1.5
Jasen Biczak	Bachelors (pursuing Masters)	3

*Note –present faculty vitae as an appendix to this document or as a hyperlink only. Do not include copies of vitae directly within this section.

O Link to copies of vitae for all tenure-line or tenured faculty.

Included in Appendix A.

O Link to copies of vitae for all full-time temporary faculty.

N/A

O Link to copies of vitae for all adjunct faculty.

Included in Appendix B.

• Service

O Highlight achievements in program, department, college, and university service for all tenure-line and tenured faculty over the last three years.

• Continuing Education

O Highlight achievements in training, development and other continuing education by all tenure-line and tenured faculty over the last three years.

•Stakeholder Perceptions of the Quality and Composition of Faculty

O Evaluate current students' perception of the composition and quality of program faculty.

q4e Overall experience: Instructors are knowledgeable regarding the topics being taught.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.2	2.2	2.2
	Somewhat Agree	11	24.4	24.4	26.7
	Strongly Agree	33	73.3	73.3	100.0
	Total	45	100.0	100.0	

q4f Overall experience: Instructors are enthusiastic about the topics being taught.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.2	2.2	2.2
	Somewhat Agree	17	37.8	37.8	40.0
	Strongly Agree	27	60.0	60.0	100.0

These results are from our survey of current students. Out of 45 respondents, 44 of them thought the faculty are both knowledgeable and enthusiastic.

*Note –present summary results of the SAI or IDEA student evaluation of faculty performance as an appendix to this document or as a hyperlink only. Do not include copies of SAI or IDEA evaluation forms directly within this section.

The committee contacted the Dean's office to get summaries for all of the MFGE faculty. Per Debbie Fisher (see the e-mail copied below) the information that is available only covers the College of Engineering Technology overall and does not break out faculty groups.

Hi Mark,

I don't know if this is going to be much help. It's a report for the college overall, not just the Manufacturing Group. Currently, we don't have any compiled data that would help in the APR reports. It's against our policy to share SAI numbers, as far as individual numbers with any entity. What I've compiled is incomplete because it's the online results only. This does not include those who used paper SAI forms and also keep in mind that we only require two courses a semester to be evaluated whether it's on paper or online.

The data that the dean's office compiles currently, is the statistics for Q22 and Q23 for the PROE's and this too is technically incomplete because each faculty member only has to have 2 courses evaluated per semester and they can be associate or bachelor degree levels.

Further discussion is needed with regards to the APR reports and SAI data. Someone will get back with you when a more defined answer is reached.

Debbie

O Evaluate alumnus perceptions of the composition and quality of program faculty.

q6b Quality of classroom instruction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Satisfied	8	32.0	32.0	32.0
	Very Satisfied	16	64.0	64.0	96.0
	No Opinion	1	4.0	4.0	100.0
	Total	25	100.0	100.0	

Per the survey results shown above the overall opinion of the quality of classroom instructions is that they were Somewhat Satisfied or Very Satisfied.

O Evaluate advisory board members' perceptions of the composition and quality of program faculty.

q7 How prepared for employment are FSU grads

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Prepared	2	50.0	50.0	50.0
	Very Prepared	2	50.0	50.0	100.0
	Total	4	100.0	100.0	

Our survey did not ask that questions directly but the survey answer above corroborates that our graduates are prepared which reflects directly on their classroom experience as guided by the MFGE faculty.

Program Policies and Procedures

O How does the program provide opportunity and encouragement for program faculty to fully engage in teaching improvement activities, research, and service?

The department strongly supports any training requested by the faculty through department funds and also via professional development funds through the CET.

O How does the program provide opportunity and encouragement for program faculty to fully engage in student advising?

All faculty are assigned some number of students in order to assure complete engagement of the entire faculty group in the advising process. Currently, faculty are assigned to specific campuses and those student groups due to the inherent differences between the traditional and non-traditional students.

O Evaluate the minimum qualifications for a tenure-line faculty within the program.

Tenure line faculty are required to have a minimum of a Master's degree in a technical or related field. Five years or more of suitable hands-on work experience is also required.

O Evaluate the minimum qualifications for a full time temporary faculty within the program.

N/A

O Evaluate the minimum qualifications for an adjunct faculty within the program.

Minimum qualification include a Bachelor's degree in a technical or related field. Five years or more of suitable hands-on work experience is also required.

•Hiring and Retention

O Evaluate the program's ability to hire and retain quality faculty at all levels.

We have hired two excellent faculty members within the last two years which demonstrates the availability of candidates interested in teaching in our program. Retaining faculty has not been an issue.

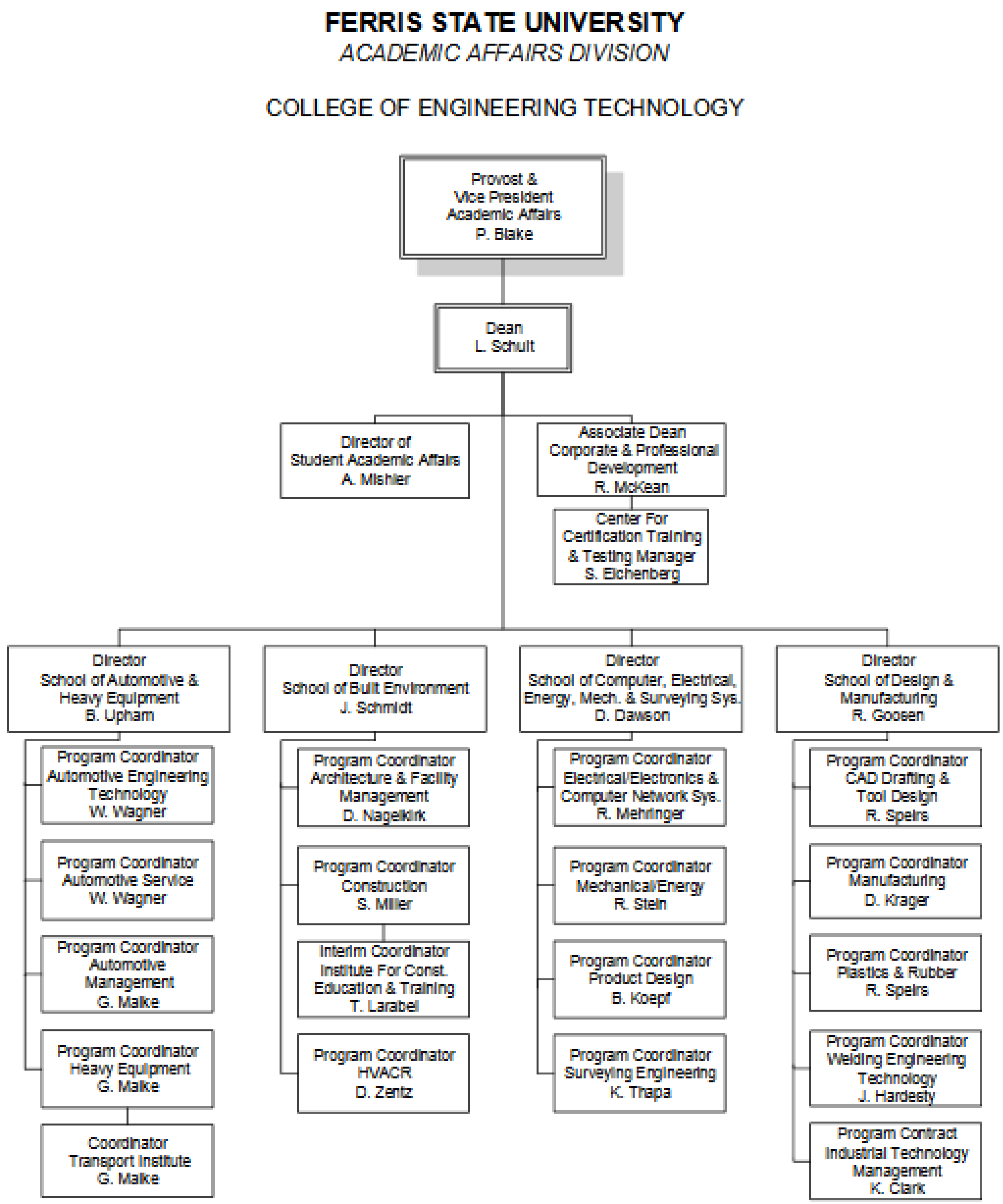
Program Administration and Support

Administrative oversight for a program (at all levels) is critical for program success. This section provides programs an opportunity to describe the current administrative and support structure impacting the program, the perceived effectiveness of the structure, and suggestions for improvement.

•

Administration

O Include a copy of the organizational chart by college including the program's place within the overall unit structure.



O Identify administrative positions by title that have program oversight up to and including the Dean of the college.

Director, School of Design & Manufacturing, Dean.

O Report the name, highest degree earned, and administrative experience for all administrative positions with program oversight.

This committee does not have the resources to provide that information. If the APR committee wishes to inquire regarding their qualifications we suggest that you contact them directly for more information.

O Evaluate the efficiency and effectiveness of the current structure.

It works as well as every other structure attempted within the college.

O Evaluate the positive aspects of the current structure.

We have direct input to our program coordinator. The director meets with our group periodically and is very approachable with any issues we have encountered.

O Evaluate opportunities for improving the current structure.

None.

Staff

O Report the number of support staff (by title) assigned to the program.

Department Secretary.

O Evaluate the efficiency and effectiveness of the current structure.

It is very efficient. If you need something done, you go and ask Sandy Larie to do it. It gets done.

O Evaluate the positive aspects of the current structure.

Sandy is very helpful to anyone that walks in her door.

O Evaluate opportunities for improving the current structure.

Get another Sandy.

Support Services

Successful programs rely on support services provided by the University in order to deliver the highest quality product for students. This section gives programs an opportunity to speak to both the positive attributes of university support services and opportunities for improvement.

Support Services

For the following support services and offices available to programs and students across campus, evaluate how the services have been utilized by the program, how the services are made +available to program students, how the services serve overall program needs and established goals, positive dimensions of the services available, and opportunities for improving service offerings and operations.

O FLITE – adequate.

O Faculty Center for Teaching and Learning – excellent support for Blackboard and orientation for new faculty.

O Tutoring Center – adequate.

O Technology Assistance Center (TAC) – excellent support from Dean Kludy, the typical telephone support is good.

O Birkam Health Center – adequate.

O Media Productions – excellent, quick response.

O Institutional Research Board (IRB) – adequate.

O Career Center – adequate.

O Institutional Research and Testing – adequate.

O University Advancement and Marketing (including web content) – adequate.

O Diversity and Inclusion Office – adequate.

O Educational Counseling and Disabilities Services – adequate.

O Grounds and Maintenance – adequate.

O Other –please specify

Facilities and Equipment

The quality and availability of facilities and equipment is an important component of a quality program. Not only does the proper physical environment allow for cutting edge pedagogy, but serves as a marketing and promotion tool for potential students and other stakeholders. This section provides programs an opportunity to describe the current resources available for program operations, an analysis of the quality of program resources and their impact on program quality, and program plans and actions for acquiring the appropriate and necessary program resources that enables delivery of the highest quality program.

Space

O Provide a detailed accounting of all teaching space used by the program.

As a program, the Manufacturing Engineering Technology program teaches most of the classes in various rooms scattered throughout the Swan building. Rooms 101, 105b, 106, and 311 in the Swan building are assigned as MFGE rooms, all other classes are scheduled in other rooms on an as-needed and as-available basis.

O Provide a detailed accounting of all laboratory space used by the program.

As a program, the Manufacturing Engineering Technology program is assigned only room Swan 306, which is the Metallurgy lab. The MFGE program does use other labs assigned to other programs where possible, such as the machine lab administered by the MFGT program.

O Provide a detailed accounting of all office and meeting space used by the program.

Faculty are assigned offices in Johnson Hall. The main program office shares space and staff with the WELD program in Swan 108. There is no fixed meeting space used by the program.

O Provide a detailed accounting of all storage space used by the program.

There are two small storage rooms in Swan 101. Other storage space is borrowed in the machine lab from the MFGT program.

O Provide a detailed accounting of all other space used by the program.

N/A

O Evaluate the adequacy of the space available for use by the program.

The space allotted to the MFGE program is inadequate.

O How does the program plan to address potential negative program impact as a result of the current state of space available for use by the program?

The state has provided money to remodel, enlarge, and enhance the Swan Annex. This space will provide larger lab spaces for MFGE, MFGT, MECH, and WELD. Additional classroom and lab space will be provided in the second level.

O What changes to the space available for use by the program would have a positive impact on program quality?

Completing the improvement outlined above.

Computers

O Provide a detailed accounting of the computers available for use in the classroom(s).

MFGE students are required to provide their own laptop computer.

O Provide a detailed accounting of the computers available for use in the laboratory(s).

N/A

O Provide a detailed accounting of the computers available for use in faculty offices.

Faculty are provided laptop computers by the TAC.

O Provide a detailed accounting of computer labs available for student use.

A computer lab is provided in Swan 105a, administered by the MFGT program for their CAM programming. MFGE students can use this lab during open hours.

O Evaluate the adequacy of the computers (including software) used by the program.

They're adequate.

O How does the program plan to address potential negative program impact as a result of the current state of computers available for use by the program?

No plan, the students are responsible for providing their own computing systems.

O What changes to the computers available for use by the program would have a positive impact on program quality?

None.

Equipment

O Provide a detailed accounting of the equipment available for use in the classroom(s).

All classrooms administered by the MFGE program are equipped with instructor stations that give access to a media projector, document cameras, and internet access.

O Provide a detailed accounting of the equipment available for use in the laboratory(s).

The equipment list for the metallurgy lab is extensive, and is slated to be upgraded in the upcoming building expansion. That list is not included in this report as it will change soon anyway.

Perceptions of Overall Quality

The process of program review is one element in a program's plan for continuous quality improvement. This section provides the program, program administration, and interested individuals from outside the program an opportunity to grade their impression of overall program quality. The overall rating should be assigned in consideration of the program as it relates to the following: relationship of the program's mission to its department, college, and the university; program visibility and distinctiveness; enrollment; the characteristics, quality, and employability of students; the quality of the curriculum and assessment; the composition and quality of faculty; the composition and quality of program administration; and the overall value of the program to stakeholders, including Ferris State University.

Note –this section should be (at a minimum) completed by the Program Coordinator, department Head / Chair, Dean, PRP member with Special Interest in the Program, and the PRP Faculty Member from Outside the College.

•Perceptions of Overall Quality

O On a scale of 1 –100 (with 100 representing the highest program quality achievable) rate the overall quality of the program.

All five of the positions listed above were polled for their opinion. So far, 3 have answered and their opinions are included in Appendix D. The average score is 91/100 showing excellent overall quality.

O Summarize the reason(s) for the rating assigned.

Outstanding placement rate at high salaries, hands-on practical experience, and relevant quality instruction.

O Outline recommended next steps to improve program quality.

Work on certain topics that are somewhat dated, further inculcate the laptop initiative, and continue to improve the collaboration between MFGE and MFGT.

Implementation of Findings

The formal process of Academic Program Review is designed to be one action in a program's overall plan for continuous program quality improvement. Although there is great value in undergoing the process itself, the real value of program review is in the dissemination and implementation of findings. This section gives programs an opportunity to outline plans for putting into practice results of its completed analysis.

•Implementation of Findings

O How does the APR review process fit with the program's overall continuous quality improvement plans?

The MFGE program is a firm supporter of continuous improvement. We see the APR review process as another tool in our arsenal to evaluate continuous improvement opportunities.

O How will program review results be communicated to program stakeholders?

The results will be reviewed during a faculty group meeting and the industrial advisory board meeting in the spring.

O What are program plans for addressing opportunities for improvement uncovered as a result of the program review process?

Any opportunities uncovered during this process will be discussed during future faculty group meetings.

Appendix A

Full Time Faculty Resumes

Blaine R. Danley

EDUCATION

May 1991 **M.S., Metallurgical and Materials Engineering**
Michigan Technological University, Houghton, MI

May 1988 **B.S., Metallurgical and Materials Engineering**
Michigan Technological University, Houghton, MI

PATENTS

- ***U.S. Patent # 6,565,723***, *ISOLATED GROUND SENSOR ACHIEVED USING ALUMINA COATING OVER SPINEL* (May 20, 2003)
- ***U.S. Patent # 6,613,468***, *GAS DIFFUSION MAT FOR FUEL CELLS* (September 2, 2003)
- ***U.S. Patent # 6,638,484***, *SINGLE DIELECTRIC BARRIER NON-THERMAL PLASMA REACTOR AND METHOD-PLANAR AND SWEPT SHAPES* (October 28, 2003)

EXPERIENCE

June 2006 – present **Ferris State University**
Big Rapids, MI

Associate Professor, College of Engineering Technology

- Primary responsibility is to teach Material Science classes including MATL 240, MATL 341, and WELD 422
- Develop and update course content for Material Science classes
- Obtain funding, specify, purchase, and maintain equipment in the Material Science Laboratory
- Advise students

August 2000 – June 2006 **Ferris State University**
Big Rapids, MI

Assistant Professor, College of Engineering Technology

- Primary responsibility is to teach Material Science classes including MATL 240, MATL 341, and WELD 422
- Develop and update course content for Material Science classes
- Obtain funding, specify, purchase, and maintain equipment in the Material Science lab

June 1997 – August 2000 **Delphi Automotive Systems**
Flint, MI

Senior Manufacturing Engineer

- Developed materials and manufacturing process for solid oxide fuel cells
- Evaluated fuel cell designs for reliability, cost, and ease of manufacturing
- Developed plasma spray process to apply protective coating on oxygen sensor elements
- Designed, installed, and qualified plasma spray equipment for oxygen sensor production
- Evaluated accelerated durability test results for oxygen sensors

June 1995 – June 1997 **General Motors Corporation**
Delphi Automotive Systems, Flint, MI

Senior Experimental Metallurgist

- Developed and taught beginning and advanced courses on welding engineering to process engineers within General Motors
- Evaluated and specified equipment for metallurgical laboratory and supervised lab personnel
- Performed failure analysis on automotive components from accelerated tests and field failures
- Developed materials and procedure to weld nodular cast iron to stainless steel for exhaust application
- Specified and evaluated materials for automotive exhaust systems

June 1992 – June 1995 **General Motors Corporation**
AC Rochester Division, Flint MI

Process Development Engineer

- Troubleshoot welding processes involving GMAW, GTAW, plasma, and resistance welding
- Programmed robots for various welding and part handling applications
- Applied "Design of Experiments" methodology to study various manufacturing processes
- Performed metallurgical analysis of components to qualify production equipment/processes

June 1991 – June 1992 **General Motors Corporation**
AC Rochester Division, Flint, MI

Associate Engineer

- Assigned to National Institute of Standards and Technology (NIST) in Boulder, CO to co-develop a system to monitor GMAW and GTAW processes
- Implemented GMAW and GTAW process monitoring on production equipment
- Presented paper at AWS Conference "Commercialization of Advanced Joining Technology Through Industry-Government Partnering"

September 1989 – June 1991 **Michigan Technological University**
Houghton, MI

Graduate Research Assistant

- Completed thesis on *"A TEM Study on the Morphological Stability of Polycrystalline Thin Films"*
- Performed TEM and SEM analysis of thin films
- Produced thin films using sputtering and CVD techniques

June 1988 – August 1989 **Howmet Corporation**
Whitehall Casting Div., Whitehall, MI

Associate Metallurgist

- Trained in manufacturing methods to produce super alloys for investment casting
- Trained in all aspects of investment casting equiaxed, directionally solidified, and single crystal aircraft engine turbine parts including molding, casting, heat treatment and inspection

ADDITIONAL ACTIVITES

- Member ASM International
- Chair of Membership Committee for ASM International (2002-2004)
- Vice Chair of Membership Committee for ASM International (2001)
- Member American Welding Society
- Ferris State University Academic Senate Representative (2006-2008)
- College Curriculum Department Representative (2005-present)
- Developed and delivered a 4 hour continuing education seminar on Metallurgical Weld Analysis to high school instructors at the 2004 State Secondary Welding Competition.
- Developed and delivered training to local companies including Yoplait, Mark IV Automotive, Beverlin Manufacturing, Tubelite, and Four Winds in various topics including: Lean Manufacturing, Working with Metals, and Working with Non-Metals. This work was contracted through the FSU Technology Transfer Center.
- Moderated graduate level courses for General Motors "Technical Education Program"
  - Materials in Design and Manufacturing, *University of Michigan*
  - Welding and Joining, *Massachusetts Institute of Technology*
  - Manufacturing Processes, *Columbia University*

MARK DUNNEBACK Manufacturing Engineering Technology
College of Engineering Technology Office: Johnson Hall 313
Phone: 231-591-2955
Email: markdunneback@ferris.edu

Updated April 2016

ACADEMIC TEACHING EXPERIENCE

August 2013 to Present
Assistant Professor Manufacturing Engineering Technology Program
Ferris State University, Big Rapids, MI 49307
Teaching Lecture and laboratory courses to Junior and Senior level students in Automotive, Manufacturing, Welding, Plastics, and other majors of study. Specific courses include:

MFGE 341	Quality Statistics
MFGE 353	Statistical Quality Control
MFGE 324	Process Planning I
MFGE 326	Process Tolerance Design Analysis
MFGE 342	Statistical Process Engineering
MFGE 311	Industrial Engineering
MFGE 423	Engineering Economics
MFGE 393	Internship- Manufacturing Engineering
MFGE 421	Automation and Systems Engineering
MFGE 422	Facilities Planning
MFGE 442	Design of Experiments I
MFGE 411	Process Planning II

January 2011 to August 2013
Adjunct Professor Manufacturing Engineering Technology Program
Ferris State University, Big Rapids, MI 49307 (Grand Rapids Campus)
Teaching Lecture and laboratory courses to Junior and Senior level and non-traditional transfer students in Manufacturing, Quality, and other majors of study.
Specific courses include:

MFGE 421	Automation and Systems Engineering
MFGE 422	Facilities Planning
MFGE 311	Industrial Engineering

August 2011 to December 2011
Adjunct Professor Mathematics
Muskegon Community College, Muskegon, MI 49442 (Muskegon Campus)
Teaching a lecture course to non-traditional and freshman students who have mastered basic arithmetic but are not yet prepared for algebra.
Specific Course:

MATH 038	Pre-Algebra

Committee Activities

Ferris State University-
Academic Senate Diversity Committee- appointed to three-year term August 2013-2016

College of Engineering Technology- Manufacturing

Engineering Department-
Welding and Manufacturing Building Campaign (Renovation to Swan Annex) Fall 2014 -

Industrial Work Experience

April 2012 – August 2013
Quality Manager ITW Dahti, Rockford, MI

- Led 5 direct & 4 indirect reports (mix of Supervisors, Engineers & Technicians) across 3-shift 5-day operation of approximately 120 employees
- Reduced main Customer PPM score by 54% in first year
- Implemented Lean paperless reporting system for QA & SPC reporting
- Restructured Internal Audit system to reflect process approach
- Facilitated A-3 and PDCA- joint projects with HMPS (customer)
- Developed direct scrap accounting for Value Streams

2009-2012
Quality Assurance Supervisor, Senior Quality Engineer, The Tech Group (West Pharma),Walker, MI

- Led 14 direct & 2 indirect reports (mix of Engineers and QA Technicians) across 4-shift 7-day operation of approximately 300 employees
- Improved main Customer SQP score from under 70% to >98% over three years
- Facilitated soft cost savings with MDT (customer) using 6 sigma and PDCA projects for joint scrap reductions on Blood pump Value Stream
- QA Oversight for all Injection molding components in 42 machine division
- Implemented Measurlink QC system for SPC reporting (wireless database)

2008-2009

Manufacturing Engineer / S-3 Supervisor, Microelectronics, Gentex Corporation, Zeeland, MI

- Led 12 direct reports (mix of Operators & Technicians) in 3rd shift production
- Responsible for Quality & Manufacture of components in microelectronics Value Stream: scheduling, CAPA, OEE, Kaizen and PDCA events
- Applied Heijunka scheduling for micro-component assembly in MEA

2007-2008

Process Engineer, Transfer Dies Department, Pridgeon and Clay, Inc., Grand Rapids, MI

- Q.E. & M.E. responsibilities for 5 Transfer presses, support personnel & equipment in automotive segment (exhaust & heat shielding)
- Direct Quality contact for Tier 1 & OEM Customers of respective parts
- Internal Auditor for TS16949, 5S, Safety

1997-2007

Team Leader & Gage Engineer, Fixture Builder & Metrologist , Peterson Jig and Fixture, Rockford, MI

- Organized Value Stream approach to fixture building
- Developed standard work, job descriptions & responsibilities to support VSM method for one-piece flow
- Lead builder for GM, Pontiac, Toyota platforms attribute & variables gaging
- Diverse background with Gage R&R, cpk, GD&T in multiple industries

Education

Doctorate of Education- Community College Leadership (DCCL) Ferris State University, Big Rapids, MI.
Candidate for Doctorate (2018)
Dissertation topic: Workforce Development

Master of Science degree- Management Sciences (MSM)
Cornerstone University, Grand Rapids, MI. Graduated summa cum laude (4.0/4.0)
2012

Bachelor of Science degree- Quality Engineering Technology (BS-QUET) Ferris State University, Big Rapids, MI.
Graduated cum laude awarded “Outstanding Student” QUET 2009

US Dept. labor / State of MI Certification - Journeyman Toolmaker Grand Rapids Community College, Grand Rapids, MI. Graduated member Phi-Theta-Kappa Honor Society
2001

Associates of Science degree- Math and Life Sciences (AAS) Aquinas College, Grand Rapids, MI.
1995

Professional Certifications

Certified Quality Engineer- ID# 55870 American Society of Quality Certified

Quality Auditor- ID# 41476 American Society of Quality Certified Quality

Technician- ID# 21877 American Society of Quality

Certified Journeyman Toolmaker U.S. dept. of Labor & State of Michigan

Professional Affiliations

American Society of Quality- ASQ
Senior Member, Local 1001, Grand Rapids, MI
2010-Current

Society of Manufacturing Engineers- SME Member,
Grand Rapids Chapter 38
Faculty Advisor, Ferris Student Chapter 129
2013-Current

Business Institutional Furniture Mfg. Association- BIFMA Member,
Grand Rapids Chapter
2012-Current

Professional Development & Training Taken

ISO/TS 16949:2009 Lead Auditor Recertification Training
Management Solutions Group, Inc. Grand
Rapids, MI
August 2015

ISO/TS 16949:2009 Lead Auditor Recertification Training
Management Solutions Group, Inc. Grand
Rapids, MI
July 2014

New Faculty Orientation (Full Time Tenure Track) Ferris
State University
Big Rapids, MI August
2013

MyFSU and Ferris Connect (Blackboard Training) Ferris
State University
Big Rapids, MI
August 2013

New Faculty Transition Programs (FCTL) Ferris
State University
Big Rapids, MI
Fall 2013- Summer 2014

Mold Master Systems I RJG
Traverse City, MI June
2011

Special Assignments & Projects

October 2015
Ferris Foundation | Amerikam Bell project
Description: Facilitated manufacture of 600 bells with students for the Ferris Foundation Gala, November 2015. Identified student team; coordinated production efforts between students and Amerikam sponsors; oversaw production efforts at Big Rapids campus, and assembly at Amerikam facility. This event highlighted as part of Ferris Foundation Gala, emphasizing the importance of industry partners within the College of Technology.

March 2015
Lansing Legislative Luncheon
Description: Represented the MFGE program at the annual Lansing Legislative luncheon: created display and presentation for the program; chaperoned student representatives; served as program representative during the event, answering questions regarding the pending SWAN building renovation (under debate in state legislature at time of visit).

March 2015
Inspec. Inc. Metrology Road Show
Description: Identified a new industry partner (Inspec. Inc.) and coordinated 2-day open house of current metrology technology for students and area industry. Secured building space in SWN; worked with catering and physical plant to provide support; worked with faculty in WET, MFT, MFGE, and AET to allow students in related courses to visit open house and perform class projects (students submitted reports for course grades). This event also brought area industry partners on campus, allowing them to see updated CNC equipment in the SWN Mfg lab.

Consulting & Training Given

April 2015
ISO/TS 16949 Internal Audit preparation, Trebor Industries, Owosso, MI
Description: Conducted two onsite visits to train managers and employees for participation in ISO/TS 16949 systems auditing (training required by their Customer and registrar).

May 2015
ISO/TS 16949 Internal Auditor Training, ThreeBond International, Westchester, OH
Description: Consulted during three-day internal audit to ISO / TS standards. Trained on proper use of pFMEA and Control Plans in auditing. This is an annual occurrence to meet registrar’s training requirements.

May – July 2015
Quality Systems consulting, Mill Steel Corporation, Grand Rapids, MI
Description: Consulted over several site visits on the ISO / TS standards. This included onsite training of internal auditors, facilitating responses to third party audit, and creation of a corporate scorecard for quality metrics.

July 2015
MMOG systems accreditation, Bleisthal, Battle Creek, MI
Description: Audited the ERP and QMS systems for MMOG compliance (Materials Management Operations Guidelines). This involved a two day onsite audit in conjunction with Management and ERP representative to generate ratings report for Tier 1 automotive Customer.

June - August 2015
Quality Systems consulting, Decked LLC, Ketchum, ID
Description: Consulted during several monthly conference calls and a two-day visit of facilities to help create a Quality Management System for this start-up company: included training on CAPA, Root cause analysis, components of ISO / TS standards critical to manufacture and assembly.

August 2014
ISO/TS 16949 Internal Auditor Training, ThreeBond International, Westchester, OH Description: Consulted during three-day internal audit to ISO / TS standards; trained three company auditors in process of conducting full systems and several process audits. Trained on proper use of pFMEA and Control Plans in auditing.

July 2014 – August 2014
ISO 9001:2008 Implementation, Metallurgical High Vacuum Corporation, Fennville, MI Description: Served as consultant over 6-week period, assisting company with creating and implementing an ISO 9001 compliant Quality Management System, toward eventual goal of third party registration for ISO 9001:2008.

July 2014
Training on core PPAP tools, Pliant Plastics, Spring Lake, MI
Description: Co-presented with Audit Instructor from Management Solutions Group regarding core PPAP tools (Feasibility, PFD, FMEA, Control Plan, MSA) to employees being trained for Internal Auditing to ISO/TS 16949:2009 3rd edition rules.

June 2014
ISO 9001:2008 Compliance Audit, Specialty Gage, Sparta, MI
Description: Conducted two-day audit and consult of ISO systems and documentation for machine shop seeking third party registration for ISO 9001:2008.

May 2013 – August 2013
ISO 13485 Implementation, Motion Dynamics Corporation, Muskegon, MI
Description: Serve as consultant for implementation of ISO 13485 into existing ISO 9001 manufacturing facility. Outlined process approach and guided creation of necessary documentation.

May 2011, October 2011
Workshop Presenter, New Employee Onboarding, Tech Group, MI
Description: Train employees on ISO-13485 and cGMP requirements per CFR part 21- the requirements for FDA compliance of manufacture and assembly of medical devices.

June - October 2010
Technical Advisor, Quality Technician Certifications, Tech Group, MI
Description: Coordinate training and certification of staff members as Certified Quality Technicians, for readiness to sit for ASQ-CQT examination.

Publications & Presentations Given

October 2015
SME Student chapter visit to Amerikam, Grand Rapids, MI
Description: Worked with Amerikam to lead student group through the manufacture of bells for the Ferris Foundation Gala (November 2015). This included working with Ferris Marketing to create a promotional video presentation.

May 2014
SME Grand Rapids Chapter 38 Visit to Amerikam, Grand Rapids, MI
Description: Gave joint presentation with members of Amerikam management to members of SME regarding Ferris State University MFGE program at large, the MFGE 324 project at Amerikam, and specifics of PPAP and problem solving tools taught in MFGE courses.

Nathan Leatherman

30 N Millbrook ct. * Muskegon, Michigan 49442 * 231.343.5437 * NathanLeatherman@ferris.edu

Updated October 2015

Academic Teaching Experience

August 2014 to Present
Assistant Professor Manufacturing Engineering Technology Program
Ferris State University, Big Rapids, MI 49307
Specific courses include:

MFGE 312	CNC and CAM
MFGE 321	Metrology
MFGE 341	Quality Science Statistics
MFGE 342	Statistical Process Engineering
MFGE 351	Introduction to Industrial Engineering
MFGE 352	Design for Manufacturing
MFGE 353	Statistical Quality Control
MFGE 393	Internship – Manufacturing Engineer

January 2009 to May 2014
Adjunct Professor Mathematics and Physical Sciences Program
Muskegon Community College, Muskegon, MI 49442
Specific courses include:

ENGR 105	Introduction to Engineering
Math 050	Intermediate Algebra
Math 111	Algebra with Coordinate Geometry
Math 112	Trigonometric Functions with Coordinate Geometry
Math 115	Probability and Statistics
Math 161	Calculus 1

Committee Activities

Ferris State University-

College of Engineering Technology- Sabbatical

Review Committee

Manufacturing Engineering Department-

Building Development Committee

Industrial Work Experience
August 2005 to August 2014
Project Engineer/Quality Manager/Plant Manager
Aero Foil International, Muskegon, MI 49442

Education

Bachelors of Science in Biomedical Engineering (Suma Cum Laude), 2004
Michigan Technological University

Masters of Science in Mechanical Engineering, 2008
Western Michigan University

Additional Coursework

BE 4100	Cell and Tissue Mechanics	Michigan Technological University
BL 5030	Molecular Biology	Michigan Technological University
ED 5100	College Teaching	Michigan Technological University
MEEM 5210	Advance Fluid Mechanics	Michigan Technological University
MEEM 6000	Graduate Seminar	Michigan Technological University
MEEM 4405	Intro to Finite Element Method	Michigan Technological University
MEEM 5230	Advanced Heat Transfer	Michigan Technological University
MEEM 6999	Doctoral Research	Michigan Technological University
MTH 210	Communicating in Mathematics	Grand Valley State University
MTH 310	Modern Algebra	Grand Valley State University

Professional Certifications
Siemens PPQ/Quality Systems AS9100 and
NADCAP Lead Auditor General Electric Supplier
Quality
Mastercam MultiAxis and System Administration

Professional Affiliations

Professional Development & Training Taken

New Faculty Orientation
New Faculty Transition Program
Mastercam System Administrator Training

Consulting & Training Given

Manufacturing consultations for Aero Foil International
ISO/AS consultations for Aero Foil International and Schuette Metals

JAMES A. RUMPF

15882 Belmont Drive, Big Rapids, MI 49307
(231)591-3591 (office) rumpfj@ferris.edu (231)250-9727 (cell)

Problem-solving manufacturing engineering education professional with a demonstrated ability to develop, implement, and drive innovative solutions that drive out waste by using a unique combination of technical- and people skills.

Proven, hands-on success in design, development, training, coaching, and facilitation resulting in personnel development, culture shift, and significant operational impact via continuous improvement.

AREAS OF TECHNICAL EXPERTISE

Lean Concepts · Error Proofing/Poka-Yoke · 5S · Visual Factory · Six Sigma · Plant Layout
Structured Problem Solving/8D · Failure Mode & Effects Analysis (FMEA) · Standard Work · DFMA
Facilities Planning · Value Stream Mapping · Quick Changeover/SMED · Pull Systems · PDCA
Quality Function Deployment · Theory of Constraints (TOC) · Continuous Improvement/Kaizen
Discrete Process Simulation · Green Manufacturing · Automation & Robotics

PROFESSIONAL EXPERIENCE

Ferris State University, Big Rapids, MI
Professor of Manufacturing Engineering Technology 1990-present

Teach junior- and senior-level coursework in such subjects as lean manufacturing, automation & system design, green manufacturing, DFMA, computer applications, industrial engineering, plant layout, cost estimating, simulation, and engineering economics. Advise students, develop and maintain labs, introduce innovative techniques into classroom, develop new courses, and perform applied research and training with industry. Also served as coordinator for manufacturing programs for AY 2010-11 and served four terms as Ferris Faculty Association president from 2007 through 2015.

Significant accomplishments

- Applied for and received an $800K grant to develop and deliver first distance learning program in the FSU College of Technology.
- Received multiple promotions and merit increases in rank.
- Voted Most Outstanding Instructor and Most Influential Instructor in MFGE program multiple times.
- Helped dozens of companies maintain and improve market share through an economic recession via improved manufacturing- and business processes.
- Lead negotiator for two faculty-administration contracts.

Society of Automotive Engineers, Warrendale, PA
Staff Engineer-Land & Sea Technical Division 1987-1990

Provided staff engineering services to technical committees for various areas of the ground vehicle industry (particularly manufacturing technologies); oversaw referee materials, engineering aids, and product performance review programs (such as the Lubricant Review Institute). Worked with other organizations such as AIAG, SME, ISO, and ANSI on such topics as computerization and international harmonization.

Significant accomplishments

- Successfully streamlined volunteer standards committee processes for materials and manufacturing to decrease time (20%) and expense (35%) to implement.
- Negotiated transfer of hundreds of AIAG and military standards to SAE stewardship.
- Developed program to coordinate sharing of common competitors' data between auto manufacturers and suppliers, reducing overall costs by 66%.

General Motors Corporation, McKeesport, PA
Area Manager 1986-1987
Manufacturing Engineer 1982-1986
Co-op Student 1977-1982

Planned and initiated factory automation and plant facilities projects, then performed the duties associated with project conception and design through equipment specification, fabrication, and installation to start-up and troubleshooting. Performed all phases of project management, as well as mechanical and electrical design. Worked concurrently with GM Tech Center staffs on a variety of subjects including automation, robotics, production process/DFMA, project appropriations and budgets, and plant modernizations. Assumed duties of Area Manager of Rear Door and Tailgate Assembly, responsible for production, maintenance, technical support, and direct supervision of hourly personnel.

Significant accomplishments

- Implemented first quick changeover program in the Metal Assembly Department, reducing setup times by 50%.
- Designed and installed a computerized energy management system that reduced electrical consumption by 15%.
- Initiated project requests for- and installed first robotic cells for Press Room applications, reducing downtime and direct labor costs by over 20%.

EDUCATION

BS, Mechanical Engineering
General Motors Institute (now Kettering University), Flint, MI
Thesis topic: "Computer-based Energy Management System for Fisher Body - Pittsburgh"

MS, Electrical Engineering
University of Pittsburgh, Pittsburgh, PA
Thesis topic: "An Assembler for the Texas Instruments TMS32010 Digital Signal Processor"

Additional Ph.D.-level coursework in Industrial Engineering - Western Michigan University, Kalamazoo, MI

AFFILIATIONS

Society of Manufacturing Engineers (SME), Senior Member and Faculty Advisor
Institute of Industrial Engineers (IIE), Senior Member
American Society for Engineering Education (ASEE), Professional Member
College-Industry Council on Material Handling Education (CICMHE)
Flexsim Users Group

REPRESENTATIVE SAMPLE OF MAJOR PROJECTS FOR INDUSTRIAL CLIENTS WHILE AT FERRIS STATE UNIVERSITY (PROPRIETARY WORK NOT INCLUDED)

Types of Projects

Plant layout/rearrangement for improved product flow and space utilization

Custom course development and delivery

- Waste Reduction/Lean Manufacturing
- CAD
- FMEA
- Motion & Time Study
- Robotic applications
- Metalworking processes
- Automation systems (via CBT)
- Poka-Yoke/Problem Solving
- Quality Function Deployment
- Theory of Constraints

ISO 9000 documentation of production process procedures

Operator training materials

Companies

Nicholas Plastics, Grand Haven Furniture Products, Transmatic, Agapé Plastics

Electrolux

IBM

Diesel Technology, Frigidaire, Grand Traverse Stamping, Dura Automotive

Lacks, Knoll Group

Sandmold Systems, Donnelly

IMI

Fiamm

Dura Automotive

Fastco

Dura Automotive

Haworth

Overhead Alliance

Mark S. Rusco
16383 Warner Street
Grand Haven, MI 49417
(616) 846-9773 (H)
e-mail: markrusco@sbcglobal.net

Education

May 1988 **Central Michigan University**
Mt. Pleasant, MI
Masters of Business Administration G.P.A. 3.6/4.0

March 1983 **Michigan State University**
East Lansing, MI
Bachelors of Science in Mechanical Engineering G.P.A. 3.2/4.0

June 1978 **Grant Public High School**
Grant, MI
University Preparatory Diploma

Work Experience

Ferris State University
Big Rapids, MI

January 1998 - Present **Associate Professor** -- I am a tenured professor in the Manufacturing and Quality Department. I teach classes with an emphasis on quality and manufacturing systems, such as Statistics, Continuous Improvement, Reliability, Industrial Engineering, DOE, Metrology, and others.

May 1997 - December 1997 **Adjunct Faculty** -- I have taught Management Science 341 -- Quantitative Analysis and MFGE-341 -- Quality Science Statistics.

GHSP
Grand Haven, MI

September 1992- January 1998 **Quality Assurance Manager** -- I was responsible for all quality throughout three separate facilities. I had four Quality Supervisors reporting to me for a total of 22 people in the Quality Department. I wrote and implemented systems to satisfy GM's Targets for Excellence and most recently, for QS-9000. I was instrumental in writing a Project Management Procedure Manual, implemented a Lot Traceability System to include all manufactured and purchased parts, and headed a three person team that successfully registered GHSP to the QS-9000 standard (ISO 9001). I have also been instrumental in implementing the Toyota Production System of Lean Manufacturing through my involvement with the manager's team. I edited the Lean Manufacturing Guidelines, a booklet of standards used at GHSP to implement Lean Manufacturing on the shop floor, developed a set of summary charts to track the implementation by workcenter, and have actively managed the implementation through the MBO process.

May 1990 - September 1992 **Supplier Development Supervisor** --- I supervised two Receiving Inspectors and two Supplier Development Facilitators. My responsibilities were to insure the quality of all purchased parts and services. I conducted supplier quality audits, helped suppliers with problem solving and implemented a supplier certification program.

October 1988- May 1990 **Manufacturing Engineer** -- I was responsible for upgrading the productivity of the equipment and the quality of the finished parts in the Stamping Department. I facilitated a quick die change program that reduced set-up time by an average of 50% on eight presses and installed a new die lubrication system that paid for itself in six months of oil savings alone.

Muskegon Community College
Muskegon, MI

May 1991 - April 1997 **Adjunct Faculty** -- I have presented various training seminars at company sites for the college.

September 1989 - May 1994 **Holland Community Education**
Holland, MI
SPC Instructor - I taught Statistical Process Control, level I and level II, each a 36-hour course.

October 1983 - June 1988 **Hitachi Magnetics Company**
Edmore, MI
Manufacturing Engineer -- I was responsible for all aspects of bringing a new magnetic material from Research and Development to full production. I trained employees, purchased new equipment, developed and documented processes, and solved manufacturing and quality issues. This product went from shipping samples to shipping $300K/Month within one year.

Manufacturing Engineer -- (Valparaiso, IN division) I was responsible for all aspects of manufacturing, maintenance, and quality at this small ferrite magnet plant. This company was a Ship-to-Stock supplier to GM and had a historical first-time yield of over 98%.

Michigan State University Custodial Department

September 1979 - December 1982 ***East Lansing, MI***
Custodian - This was a 20 hour per week job to help pay school expenses.

Professional Memberships

April 1993 - Present American Society for Quality Member
June 1994 - Present

Additional Training

SPC Level I and Level II (Instructor)

8-D Problem Solving (Instructor)

Quick Die Change (Instructor)

Push vs. Pull Manufacturing Simulation (Instructor)

Geometric Dimensioning & Tolerancing (GD&T) (Instructor)

Failure Mode and Effect Analysis (Instructor)

Measurement Uncertainty (Instructor)

Failure Mode and Effect Analysis (FMEA) (Instructor)

References

References are available upon request.

ASQ CQE Refresher Course (Instructor)

Designed Experiments (Instructor)

Joseph A. Wist

905 Fairmount
Grand Rapids, MI 49506
616-250-8194

Education:

Michigan Technological University
Houghton, MI

Master of Science in Metallurgical Engineering - received April 1992
Bachelor of Science in Mechanical Engineering - received May 1989

Ohio State University
Columbus, OH

PhD candidate Industrial Engineering - Sept 1995- May 1995
- 21 credits (quarterly) 600+ level; completed toward Doctorate

Experience:

Associate Professor (Jan 2001 – Present)
Manufacturing Engineering Technology
Ferris State University

Courses: Manufacturing Processes; Material Selection & Design of Metals; Statistical Process Control; Engineering Economics; Design for Manufacturing; Material Science Laboratories

Manufacturing Engineer
BentelerAutomotive (June 1999 – December 2000)

- Provided front line support for the high volume production of side impact door-beams for General Motors, Chrysler, Ford, Toyota, etc.
  - ⇒ Increased productivity in the 12 weld cell assembly stations ~ 7 % through improvement in assembly tooling, floor management, and troubleshooting to keep production running.
  - ⇒ Involved in all production related corrective actions. Including determining the root causes and implementation of corrective measures
  - ⇒ Trouble-shooting of tooling and assembly components and processes on a daily basis to ensure acceptable assemblies were being produced.
  - ⇒ On a daily basis reviewed all scrap produced and initiated corrective actions and poka-yokes to decrease scrap
- Lead tooling design and build for BMW Seat Belt Anchor tooling.
  - ⇒ Determined new clamping and component presentation schemes to increase tool repeatability

Manufacturing Engineer
MacDonald Industrial Products (March 1998 – June 1999)

- Performed all aspects of engineering support for low pressure and high pressure aluminum die cast and secondary operations
  - ⇒ Reduced low pressure die cast scrap from 9% to 6% on largest low pressure product
  - ⇒ Daily involvement in resolution of quality and production issues
  - ⇒ Eliminated the need to 100 % inspect parts at 2 operations for the largest aluminum die cast customer, through continuous improvement and error proofing
  - ⇒ Increased polishing productivity for zinc window surround from 460 pieces per cell to 530 pieces per cell
- Managed tool room helping facilitate die repair and preparation for production.

Manufacturing Engineer - G.M. Powertrain Bay City (Sept. 1995 – Feb. 1998)
Welding Engineer- G.M. Lansing Automotive Div.
Aerotek Contract Engineering Services

Die Cast

- Provided all aspects of engineering support for production of die cast transmission components
  - ⇒ Determined and implemented process and process monitoring systems
  - ⇒ Initiated the use of new die cast lubricant resulting in increases of productivity of 25%
  - ⇒ On a daily basis determined root causes of scrap and implemented corrective actions
  - ⇒ Supported tool room in determining degree of die repair required and interpretation of CMM results
  - ⇒ Performed all aspects of purchasing for replacement tooling, equipment, and stores setup
- Assisted in developing and implementing a die repair and approval process to meet QS 9000 requirements.
- Managed the pre-production approval of die cast dies
  - ⇒ Coordinated die sampling, gage room CMM data collection for dimensional analysis, and machining of samples to facilitate PPAP approval of dies
  - ⇒ Initiated outside sampling of dies, thereby eliminating the need to break into production schedules
  - ⇒ Tracked die build, die approval, and visited vendor sites to review progress and resolve open issues.

Welding

- Performed tooling verification of resistance spot welding (RSW) robotic, hard tooling, and manual welding stations within construction sources
  - ⇒ Interacted with process engineers and build sources to facilitate tool construction and compliance to General Motors weld tooling standards
  - ⇒ Developed and authored weld tool verification procedures

Publications

"Electrode-Workpiece Sticking on Electrogalvanized Steel, "J.A. Wist, C.L. White, M.D. Gugel: SheetMetal Welding ConferenceVII; American Welding Society; Detroit, MI; Oct. 9, 1996

"The Influence of Resistance Spot welding Electrode Alloy Type on the Nature of Electrode and Tip Life", J.A. Wist, C.L. White, M.D. Gugel:4th International Zinc Coated Sheet Conference; Paris, France; Intergalva Conference Proceedings; June 8, 1994

"Progression of Electrode wear during the RSW of EG Steel," J.A. Wist, C.L. White; SheetMetal Welding ConferenceV; American Welding Society; Detroit, MI; Oct. 7, 1992

"Comparison of Electrode Wear in DSC Electrodes Having Different Hardnesses, "M.D. Gugel ,J.A. Wist, C.L. White; SheetMetal Welding ConferenceV; American Welding Society; Detroit, MI; Oct. 7, 1992

"The Metallugical Aspects of Electrode Wear During the Resistance Spot Welding of Zinc Coated Steels"; J.A. Wist, C.L. White; SheetMetal Welding ConferenceIV; American Welding Society; Detroit, MI; Oct. 10, 1990

Interests

Historic Home Restoration
Active Participant in East Hills Neighborhood Association Initiatives

Appendix B

Adjunct Faculty Resumes

Jasen Alan Biczak

(231) 670-9441 • 335 West Norton Avenue, Muskegon, MI 49444 • jasenbiczak@gmail.com

OBJECTIVE

To obtain a position in Engineering and Manufacturing Management that will utilize my twelve years of industry experience in the investment casting and automotive industries, education in Engineering, teaching at the university level and lean manufacturing training to optimize manufacturing processes to meet financial, safety, quality, delivery and growth objectives.

EDUCATION

Western Michigan University (Kalamazoo, MI) 2011-2014

- ★ Bachelor of Science in Engineering (Manufacturing) Degree
- ★ Institutional Honors: Cum Laude (GPA: 3.55)
- ★ 2014 Presidential Scholar Award for Manufacturing Engineering

Muskegon Community College (Muskegon, MI) 2003-2007

- ★ Associate Degree in Science and Arts (April 2005, GPA: 3.66)

EMPLOYMENT

Ferris State University (Grand Rapids, MI) September 2015 - Present

- ★ Title: Adjunct Faculty Instructor for Manufacturing Engineering Technology and Industrial Technology and Management
- ★ Teaching courses in Automation and Technology Management, Continuous Improvement, Plant Layout and Industrial Engineering

Shape Corporation (Grand Haven, MI) September 2015 - Present

- ★ Title: Manufacturing Engineer
- ★ General Functions
    - o Supporting operations for rolling mills, stamp presses, robotic welders and laser machines that fabricate automotive energy management systems
    - o Includes safety projects, labor and inventory management, scrap reduction, plant layouts, PFMEA, value stream maps, customer CARs (Corrective Action Reports), takt time analysis, motion study analysis and standardized work
- ★ Leadership Roles
    - o Backup Production Manager
    - o Trainer for Lean Manufacturing Orientation for New Hire Orientation
    - o Trainer/Mentor for four (4) new Manufacturing Engineers
    - o Support for Supervisors for employee issues and root cause problem solving
- ★ Business Growth
    - o Lead equipment installations for new technology innovations
    - o Reduce current square footage requirements using machine consolidation in order to free up floor space for new equipment and new business
    - o Develop initial concept plant layouts for the analysis of new business
- ★ Safety, Quality & Productivity Improvements
    - o Lead problem solving teams to resolve historic manufacturing problems (solved a 17 year old changeover problem for roll mill tooling, safety improvements for conveyor equipment, converted manual deburr operations to automated deburr)
    - o Lead scientific problem solving for safety issues (NIOSH, BRIEF, Push/Pull)
    - o Implement in-sourcing to reduce overall costs, handling, lead-time, provide more control

over quality on critical components and reduce square footage

Alcoa Howmet Whitehall Castings (Whitehall, MI) 2004 – August 2015

- ★ Title: Manufacturing Engineer for the Advanced Manufacturing Technology Division
- ★ Previously held positions as a part-time co-op, full-time co-op, and Jr. Mfg Engineer
- ★ General Functions
  - o Support manufacturing operations from wax to shipping
  - o Includes standardized work, Kaizen events, plant layout, equipment installations, practical problem solving, labor requirement analysis, technology innovations (ex: automated water jet, automated braze and automated finishing operations), export ITAR regulations and supporting outsourcing initiatives (ex: HdM)
- ★ Leadership Roles
  - o Instructor for Observation Training and Practical Problem Solving Training
  - o Lead Kaizen Events for Continuous Improvement efforts. The Finishing Department rearrangement shut down 50% of capacity for four weeks. Due to proper planning and execution, no customer delivery was compromised. Cell capacity increased $108k in daily throughput within the same plant footprint
  - o Executional (operator generated) Scrap Leader. Lead scrap reduction initiatives for a $15.5MM in scrap savings over 6 years (more than a 67% reduction!)
  - o Lead & participate on cross-functional teams: Ergonomics, Hearing Protection & Sound Level Reduction, Fall Protection, Fatality Prevention, Robotic Safety, and Machine Guarding. Assist in leveraging best practices across Alcoa
  - o Part of the HdM Outsourcing Team that generated Alcoa corrective actions for the accidental shipment of JSF components to HdM; helped avoid a suspension of the Alcoa export license or significant fines that could have been more than $1MM
  - o Mentor to numerous co-ops, MEs, Automation Technicians and Engineers
- ★ Business Growth
  - o Supported AHWC Plant 10 during numerous business expansion periods (wax rearrangement, monoshell, new heat treat furnaces, PF1 rearrangement, finishing cells, media, CT scan implementation)
  - o Develop the required technology for new engine programs (ex: automated braze)
  - o Spent several years as the lead for Plant 10 power pac/finishing operation outsourcing to HdM to meet growth and financial objectives for AHWC
- ★ Safety, Quality & Productivity Improvements
  - o Design and implement Daily Management tools. Develop visual and easy-to-operate support systems for operators, supervisors, and management
  - o Work with various Alcoa facilities to maximize corporate financial results. Assisted AHDC in reducing FPI rework by 45% and changeovers by 60%
  - o Customer escape investigations: lead problem solving investigation and corrective actions for Pratt & Whitney $940k return for machining defects
  - o Integration of new equipment: projects range from hand tools (burr guns that save $100k annually) to multi-million dollar robotic research projects (one project transitioned from a 43% manual first time yield to a 95% robotic first time yield)

Michael L Fick Sr   mficksr@gmail.com 616-350-5484

SUMMARY OF QUALIFICATIONS

ASQ Certified Quality Engineer, ASQ Certified Six Sigma Black Belt with 15 years' experience in strategic quality leadership/management, team guidance and coaching, quality planning, customer interaction, new product and process development. ISO Quality System Administration, supplier test and customer quality problem resolution.

- Drive strategic quality initiatives across organizational functions through the implementation of systemic tactical methodologies.
- Manage a team of 10 quality engineers who drive sustainable, robust **High Performing Processes** that achieve process excellence across the Steelcase Enterprise. Our team is a hands-on team of Quality Engineers who use:
    1. formalized problem solving processes
    2. quality science skill sets
    3. data driven analysis
    4. partnerships with sourcing, manufacturing and supplier teams
- Guide, lead and train employees, teams and cross functional managers in continuous improvement, quality improvements and technical knowledge.
- Extensive knowledge of quality engineering, design control, verification, validation tools and methodologies including: DOE, PPAP, FMEA, Capability Studies, 8D Problem Solving, Process Mapping, T-test, F- Test and ANOVA comparative testing.
- Extensive experience with establishing quality requirements for new product launches prior to product release. Quality requirements include equipment and process/product validation.
- Capable of managing multiple projects simultaneously, leading project teams and suppliers to effective problem resolutions.
- Recognized employee management and team motivation capabilities. Experience in effectively managing ten quality engineers, establishing, documenting and coaching achievable yearly metrics for employee reviews.
- Adept at grasping vague issues, developing and implementing a plan, then bringing that plan to conclusion.
- Proven track record with ISO compliance standards as ISO 9001/2000 and ISO 17025/2000 Quality Systems ISO administrator/representative
- Champion for implementing ISO 14001.

PROFESSIONAL EXPERIENCE

STEELCASE INCORPORATED – Kentwood, Michigan   2007 to Present

Global Quality Engineer Team Leader / Manager

Provide global leadership of quality management system for the world's largest manufacturer of office furniture. Specific focus on both Supplier quality and Product Development teams.

Guide, lead and direct Quality Engineers and their activities. Perform and direct a variety of quality system activities: guiding, supporting and training suppliers and product development teams. Maintain a daily presence with product launch teams, manufacturing plants and suppliers during project launch process. Work with team leaders to ensure production teams have established quality practices and robust manufacturing processes so they can produce quality product. Test and analyze comparative data to establish failure modes in customer product. Collaborate with suppliers and manufacturing plants to find a best solution for identified quality issues. Mentor and assist in the development of Steelcase and Steelcase Supplier's quality engineers and manufacturing teams.

Provide product launch teams and suppliers with the quality requirements for new products prior to launch. Conduct Supplier Readiness Reviews and approval of manufacturing processes to ensure robust manufacturing processes have been developed and are in place prior to launch. Ensure statistical data (capability studies, destruct testing) have been implemented and completed correctly.

X-RITE INCORPORATED – Kentwood, Michigan 1991 to 2007

Quality Supervisor (2000-2007)
Manufacturing Engineer (1994-2000)
Technical Draftsman/Writer (1991-1994)

Provide quality support for a leading manufacturer of color management products with over $200 million in annual revenues.

Perform and direct a variety of quality system activities: adding and maintaining ISO Compliance standards, working with external auditors and registrars. Maintain a daily presence with manufacturing team leaders to ensure production teams follow established quality practices and produce quality product. Test and analyze comparative data to establish failure modes in customer product. Collaborate with suppliers and customers to find a best solution for identified quality issues. Manage and oversee five quality Technicians that report to me on various quality functions including:

- Tracking and analyzing Manufacturing Quality Metrics
- Warranty Return analysis and Improvements
- Calibration of Measurement, Inspection and Test Equipment including World Wide Service Centers.

EDUCATION AND TRAINING

I AM CURRENTLY ENROLLED AND TAKING GRADUATE CLASSES TOWARD MY MASTER'S DEGREE IN QUALITY MANAGEMENT AT EASTERN MICHIGAN UNIVERSITY – Ypsilanti, Michigan Expected Completion: Mqrch 2017

QUALITY ENGINEERING BACHELOR'S DEGREE (MAY 2014)
FERRIS STATE UNIVERSITY – Grand Rapids, Michigan
ASQ CERTIFIED SIX SIGMA BLACK BELT (JUNE 2011)
ASQ GRAND RAPIDS – Grand Rapids, Michigan Chapter
ASQ CERTIFIED QUALITY ENGINEER (JUNE 2008)
ASQ GRAND RAPIDS – Grand Rapids, Michigan Chapter
QUALITY ENGINEERING CERTIFICATION (MAY 2007)
FERRIS STATE UNIVERSITY – Grand Rapids, Michigan
ISO-17025 AUDITOR TRAINING (2005)
PERRY JOHNSON INC – Grand Rapids, Michigan
ISO-2000 PROCESS AUDITOR TRAINING (2003)
NOT-SO-BASIC TRAINING – Grand Rapids, Michigan
8D PROBLEM SOLVING TRAINING (2001)
INDUSTRIAL OPPORTUNITIES – Grand Rapids, Michigan
DESIGN OF EXPERIMENTS (DOE) TRAINING (2000)
INDUSTRIAL OPPORTUNITIES – Grand Rapids, Michigan
ISO-9000 LEAD AUDITOR TRAINING ACCREDITED BY THE INTERNATIONAL REGISTER OF CERTIFICATED AUDITORS (IRCA) (1994)
PERRY JOHNSON INC – Grand Rapids, Michigan
2 YEAR ASSOCIATE DEGREE COMMERCIAL ART (1981)
FERRIS STATE UNIVERSITY – Big Rapids, Michigan
2 YEAR ASSOCIATE DEGREE TECHNICAL ILLUSTRATION/DRAFTING (1977)
FERRIS STATE UNIVERSITY – Big Rapids, Michigan

Harrie (Hank) W. Bonnah **1225 Eastlawn Rd SE, Grand Rapids, MI 49506**
hwbonnah@yahoo.com 616.808.1331

Executive Summary: Extensive experience in mechanical design, customer interaction and manufacturing execution; **comprehensive background in electro-mechanical design, systems & components/ R&D and lean product development for manufacturing launch**. **Demonstrated working knowledge of state-of-the-art manufacturing processes, systems, methods, quality practices and the CNC machining environment.** I use my experience, expert knowledge and education to help teams generate concrete solutions to complex problems. I lead by example converting a company into a lean enterprise, to focus all functional groups and departments toward their customer's needs and to inculcate in a company how to live a culture of excellence.

Education

BSc Mechanical Engineering – University of Central Florida
MSc Systems Management – Florida Institute of Technology

Expert in teaching and implementing Toyota Production System (TPS) & other tools:

Lean Manufacturing/VSM
GD&T, SPC, DFM
Set Based Concurrent Engineering Voice of Customer
Value Prop
Daily Management

Problem Solving Techniques (A3 PSP & Shanin), Transactional
Improvement Standard Work &
Visual Controls Lean Cell Design
PPAP/FAI
CNC evaluation/debug /SMED

Kanban & Heijunka for product development and support
Policy Deployment (Hoshin Kanri)
How to properly run a Kaizen event

September 2014 to Present – Strategy Science Incorporated, Grand Rapids MI
Principal

Member of a global organizational strategy, efficiency & effectiveness improvement network. I specialize in the interrelated areas of Adaptive Strategic Planning & Execution, Product Development Process & Culture Change, and Sales & Marketing and Technical Problem Solving.

January 2014 to September 2014 – Tubelite Incorporated, Grand Rapids, MI
Operations/Plant Manager (Lead 95 associates)

Fenestration/architectural products: doors, louvers, vents, storefronts, curtain walls and exterior shades. Responsible for the Walker Manufacturing Operation which includes fabrication and assembly operations, scheduling/planning, manufacturing engineering, warehousing operations and dedicated fleet transportation. Under my leadership we have instituted standardized metrics and daily management. We have begun to refocus from productivity as the primary metric toward safety, quality, delivery and then productivity in order of importance. In my first 6 months we have broadened our definition of safety, reduced customer complaint rate by 40%, begun to stabilize our on-time delivery metrics, and set-up Pilot process, ECO process & Deviation process. CNC environment: Elumatic SBZ140, 4 axis.

February 2009 to October 2013 – X-Rite Incorporated (a Danaher Company), Grand Rapids, MI
Director of Manufacturing Engineering (Lead 46 associates)

Precise electro-mechanical instrumentation for the measurement of color.
Responsible for New Product Introduction (NPI), Sustaining Engineering, Global Color Standards and Machining and Fabrication groups. World Headquarters DBSL (Danaher Business System Leader). Under my leadership, management, teaching and mentoring:

- X-Rite has reduced its customer return rate by 30%. Set up quadrant analysis wherein field failure is a function of production yield; Pareto prioritization of failures, Gantt based action plans linked to real improvement to drive to corrective action and engineering workload management utilizing Heijunka loading of engineering resources pulled by a Kanban ticket system

- Improved manufacturing efficiency by 35%. Led the lean conversion of 35 manufacturing cells. Put in place one-piece flow cells, 5s, standard work and standardized metrics, instituted daily management through the use of daily score cards, developed a culture of high accountability and instilled in employees the desire to carry forward relentless waste elimination.

X-rite Continued

- Fortified X-Rite's machine and fabrication organization by making hard decisions regarding roles, responsibilities and expectations; instituted concrete metrics (FTQ, Set-up goals, machine efficiency, labor productivity, OT cap, SMED). What was a dying shop now is competitive with outside suppliers and making substantial capital investment in new machine tools. Saved the shop and 25 employee's jobs. CNC environment: vertical mills; 3, 4 & 5 axis and single spindle lathes. 20+ machine tools on shop floor.

June 2007 to October 2008 – Precision Aerospace Corporation (PAC), Grand Rapids, MI
Director of Engineering and Product Services (Lead 21 associates)
Complex machining and assemblies for flight hardware, weapons systems and ordinance, armor and other mobile land platforms. Responsible for the engineering function of PAC, covering all aspects of development and execution. To bring to PAC, through my experience, mentoring and training of the entire organization that which did not exist – an engineering system that allowed PAC to grow from a $12Mio company to a $50Mio company in 5 years. Regulated environment DFARS/FAA/NADCAP. CNC environment: vertical & horizontal mills; 3, 4 & 5 axis and dual spindle twin turret lathes. 30+ machine tools on shop floor.

August 1994 to June 2007 - Delphi Corporation, Rochester, NY
Engineering Supervisor – Direct Injection Gasoline Fuel Injector Development. (Lead 28 associates)
Technical/Personnel leadership and management of Gasoline Direct Injection (DI-G) fuel injector R&D for eventual high-volume production launch. Regulated environment FMVSS

Managed, taught & mentored a global team of engineers & technicians (concurrently in U.S., Austria & Luxembourg) to be capable of developing DI fuel injectors in Europe. Directed scope, budget, schedule, equipment selection and managed implementation of a $3 Mio Launch Center in Vienna, Austria.

- Under my leadership, guidance and training, teams simultaneously developed DI-G fuel injectors for two different applications:

✓ Stratified Charge (European Team) - Led team through development of a dual coil injector to a logical technical end-point (inclusive of engine, combustion and system evaluation). Development of a revolutionary next-generation injector that met the design goal of 95% piezo actuation performance for a fraction of the manufactured cost.

✓ Homogeneous Charge (U.S. Team)- Development of a next-generation injector inclusive of competitive assessment, analytical modeling and Launch Center manufacture at prototype volumes.

- Led capital expansion of Multec 2 fuel system - $185 Mio capital project across 2 worldwide sites. Completed on time and better than budget.
- CNC Environment: CNC lathes and precision grinders. CNC Nd-YAg precision laser welding for hermetically sealed high pressure vessels. Leak testing: He mass spec., mass flow and pressure decay systems.

October 1990 to August 1994 – Siemens Automotive, Newport News, VA
Senior Product Engineer – gasoline fuel system design and manufacturing launch

July 1988 to October 1990 – Military Service, Lieutenant (jg); Naval Officer
US Department of Commerce Commissioned Corps; OCS at the U.S Merchant Marine Academy, Hydrographic survey (Underwater Maps), Navy Trained and NOAA Certified working diver. Leadership and management training with real world experience/application, especially under pressure.

Certificate/Foreign Language:
EU certificate No. 01410-01-G-20063-05 (Language – Working German) Goethe Institut / Centre de Langues LuxembourgEngineering Intern / FE exam (State Certificate Nr. 485ET024) State of Florida – Department of Professional Regulation

Awards & Achievements:
10 US Patents granted & 2 defensive publications during career at Delphi and Siemens Automotive. Granted International Service Position (ISP) – three year appointment in Luxembourg with GM/Delphi General Motors/Delphi Innovation Hall of Fame inductee

Brent M. Nienhuis

12170 Tyler Street
Holland, MI 49424
(616) 402-1250
brentnienhuis@hotmail.com

Career Objective

To continue employment in manufacturing and operations in order to gain more knowledge while also using past education and experience to contribute to the success of my employer.

Summary

- Over ten years of experience in automotive manufacturing and assembly environment dealing with lean manufacturing, 5S, production planning, capacity planning, continuous improvement, DMAIC problem solving, and project planning and management.
- Demonstrated ability to complete multiple tasks and projects on time while using minimal resources.
- Involved in automotive product launches dealing with roll forming, stamping, and MIG welded assemblies.
- Experienced in stamping, rollforming, and welded assembly processes.

Professional Experience

Technical Manager – Rollforming, Shape Corporation – Grand Haven, MI
August 2013 – Present

- Responsible for Rollform process development and advancement based on customer needs.
- Manage the Corporate Rollform Process Engineering Team including DMIAC process mentoring and project assignment
- Maintaining Rollforming equipment standards
- Oversee advanced manufacturing project to further advance the Rollforming process.
- Responsible for identifying and fulfilling global Rollforming resource needs in international locations.

Process Engineer, Shape Corporation – Grand Haven, MI
August 2012 – August 2013

- Responsible for Rollform process improvement utilizing the DMAIC process.
- Responsible for machine development of proprietary Shape Rollforming technologies.
- Led scrap reduction projects and project to improve throughput, while reducing downtime and scrap.
- Mentor other engineers in the DMAIC methodology.

Production Manager, Shape Corporation - Grand Haven, MI
August 2011 – August 2012

- Responsible for key performance indicators and P&L statement for the Toyota manufacturing department.
- Leading problem solving activities and mentoring team members in proper 5 Why analysis and root cause identification.
- Ensuring safety, quality, delivery, and cost goals are met for a manufacturing cell including three roll mills, two secondary presses, and five welders.
- Driving continuous improvement initiatives to improve quality and productivity within the Toyota department.

Lead Manufacturing Engineer, Shape Corporation - Grand Haven, MI
February 2010 – August 2011

- Led plant-wide utilization improvements utilizing DMAIC methodology.

- Led quick changeover projects resulting in utilization improvements of 50% on the changeover focus line.
- Developed plant wide capacity analysis for new product launches and current product line balancing.
- Project managed the install of a new high volume 3" roll form line and subsequent tooling moves and development over a 12 month period.
- Managed plant engineering staff and monitored key trends to ensure proper distribution of engineering resources to support plant needs.

Manufacturing Engineer, Shape Corporation - Grand Haven, MI

October 2005 – February 2010

- Led manufacturing improvement teams in projects such as scrap reduction, machine utilization, and inventory reduction. Projects focused on the roll forming and secondary metal forming processes, supplying customers such as Ford, Toyota, Trendway, Stryker, and Bombardier Recreational Products.
- Trained and mentored hourly and salary support staff on applicable Lean Manufacturing tools (5S, Standard work, Value Stream Mapping, Level Load Production Planning, SMED)
- Developed pacing mechanisms for roll forming and secondary operations including production planning.
- Troubleshot manufacturing and mechanical failures within cell, while developing and implementing solutions.
- Maintained and improved plant layouts, in addition to cell safety and ergonomic conditions.
- Conducted time studies in a live environment and developed standardized work charts.
- Led improvements to process times and work loads using motion and time study data.

Manufacturing Engineer, ITW Drawform – Zeeland, MI

May 2003 - October 2005

- Developed and implemented automated machinery to assist in a variety of secondary operations.
- Led problem solving activities to develop root cause analysis for manufacturing quality issues.
- Designed and implemented corrective actions and guided improvements from start to finish.
- Worked as an interface between manufacturing and customer contacts to understand quality issues and customer needs.

<u>Education and Training</u>

Bachelor of Science in Manufacturing Engineering Technology, May 2003

Ferris State University, Big Rapids, MI

Masters in Business Administration, August 2011

Western Michigan University, Grand Rapids, MI

Varying degrees of experience in computer applications including:

Microsoft Office Applications
AutoCAD 2008
VISIO Technical
Microsoft Project

<u>References</u>

- References available upon request

Appendix C
Checksheet and Selected Syllabi
(MFGE 411, MFGE 421, MFGE 422)

Student:	Code	Location	Crs
Email:	ID:	Ferris	
Advisor:	Ph:	1	Transfer

Entry Criteria:
1. 57 semester hours of college coursework including technical courses, general courses and technical related courses.
2. 2.5 GPA or department approval.
3. Have completed math through Algebra & Analytical Trigonometry/Pre-calculus equivalent to MATH 126/130 at Ferris.
4. Have taken a public speaking course equivalent to COMM 121 at Ferris.
5. Have completed 6 semester hours of English equivalent to ENGL 150, 250 (or ENGL 211) at Ferris.
6. Have completed 3 credit hours of an accepted scientific understanding course [Chemistry preferred].
7. Have completed a basic Material Science course equivalent to MATL 240 at Ferris.
8. Demonstrate Computer competency equivalent to ISYS 105 at Ferris or successfully complete a competency exam.
9. Have completed a Parametric Modeling course equivalent to PDET 122 at Ferris or successfully complete a competency exam.
10. Have completed a basic machining course(s) equivalent to MFGT 110 lecture and MFGT 114 lab at Ferris.
11. It is recommended that at least one Cultural Enrichment and one Social Awareness course be completed as partial fulfillment of graduation requirements.

MAJOR	Cr	Gr	Pts	S	Yr	Code	Notes
MFGE		311		Industrial Engineering (MATH 116 or 120)		4	
MFGE		312		CNC & CAM (MFGT 110, 114 or equivalent)		4	
MFGE		321		Metrology (MATH 116 or 120 or MATH ACT 24 or SAT 500)		3	
MFGE		322		Production Processes		3	
MFGE		324		Principles of Processing Planning I (MFGE 311, 312; MFGE 321, 325 co-req)		3	
MFGE		326		Process Tolerance Design & Analysis (MATH 116 or 120)		2	
MFGE		341		Quality Science Statistics (MATH 116, 120 or 126, or MATH ACT 24, SAT 500)		3	
MFGE		342		Statistical Process Engineering (MFGE 341)		3	
MFGE		393		Internship (Department Approval)		4	
MFGE		411		Principle of Process Planning II (MFGE 322, 324, 342)		2	
MFGE		421		Automation & System Design (MFGE 411)		4	
MFGE		422		MFGE Facilities Planning (MFGE 411)		3	
MFGE		423		Engineering Economics (MATH 116, 120 or 126 or MATH ACT 24 or SAT 500)		2	
MFGE		442		Design of Experiments 1 (MFGE 321, 341)		3	
TECHNICAL RELATED							
MECH		340		Statistics & Strengths of Materials (MATH 126 or 130; PHYS 211)		4	
PLTS		325		Plastic Processes		2	
WELD		416		Production Welding Processes (may be taken in alternative sequence)		2	
COMMUNICATIONS COMPETENCE							
QUANTITATIVE							
MATH		220		Analytical Geometry and Calculus I (MATH 126 or 130)		4	
SCIENTIFIC UNDERSTANDING							
PHYS		211		Introductory Physics I (MATH 116 or 120)		4	
CULTURAL ENRICHMENT							
Cultural Enrichment Elective				3			
Cultural Enrichment Elective (200 level or above)				3			
SOCIAL AWARENESS							
Social Awareness Elective				3			
Social Awareness Elective (200 level or above)				3			
Unofficial Statistics							
Major: Total Crs / Earned Crs / Honor Points				43			
Degree: Total Crs / Earned Crs / Honor Points				71			
GPA Major:				-			
GPA Degree:				-			

Fall 2016 Contact the Manufacturing Program office for more information Phone: 231-591-2511 Email: Manufacturing Department@ferris.edu www.ferris.edu/manufacturing

Student:

Email:	ID:
Advisor:	Ph:

YEAR 3 - FALL SEMESTER			Crs	Gr
MFGE	311	Industrial Engineering (MATH 116 or 120)	4	
MFGE	312	CNC & CAM (MFGT 110, 114 or equivalent)	4	
MFGE	341	Quality Science Statistics (MATH 116 or 120 or 126 or MATH ACT 24 or SAT 500)	3	
PHYS	211	Introductory Physics I (MATH 116 or 120)	4	
Cultural Enrichment Elective			3	
Total			**18**	

YEAR 3 - SPRING SEMESTER			Crs	Gr
MFGE	321	Metrology (MATH 116 or 120 or MATH ACT 24 or SAT 500)	3	
MFGE	322	Production Processes	3	
MFGE	324	Principles of Process Planning I (MFGE 311, 312; MFGE 321, 326 co-req)	3	
MFGE	326	Process Tolerance Design & Analysis (MATH 116 or 120)	2	
MFGE	342	Statistical Process Engineering (MFGE 341)	3	
Social Awareness			3	
Total			**17**	

Submit Application for Graduation.

YEAR 3 -SUMMER SEMESTER			Crs	Gr
MFGE	393	Internship (Department Approval)	4	
Total			**4**	

YEAR 4 - FALL SEMESTER			Crs	Gr
MFGE	411	Principle of Process Planning II (MFGE 322, 324, 342)	2	
MFGE	442	Design of Experiments 1 (MFGE 321, 341)	3	
MECH	340	Statistics & Strengths of Materials (MATH 126 or 130; PHYS 211)	4	
MATH	220	Analytical Geometry and Calculus I (MATH 126 or 130)	4	
WELD	416	Production Welding Processes (may be taken in alternative sequence)	2	
Total			**15**	

YEAR 4 - SPRING SEMESTER			Crs	Gr
MFGE	421	Automation & System Design (MFGE 411)	4	
MFGE	422	MFGE Facilities Planning (MFGE 411)	3	
MFGE	423	Engineering Economics (MATH 126 or 130 or MATH ACT 24 or SAT 500)	2	
PLTS	325	Plastics Processes	2	
Social Awareness Elective (200 level or above)			3	
Cultural Enrichment (200 level or above)			3	
Total			**17**	

Bachelor of Science General Education Requirements

Cultural Enrichment - 9 credits, Social Awareness - 9 credits [3 credit course in each area at or above 200 level] **must be in two different subject areas.**

One Global Consciousness Course (3 cr), One Race-Ethnicity-Gender (REG) Course (3 cr), One Foundation Course (3 cr)

Multiple requirements may be satisfied by a single course.

Students must complete 40 credits at or above the 300 level.

Reference: http://www.ferris.edu/htmls/academics/gened/gen_edspecific.html

Course Syllabus

FERRIS STATE UNIVERSITY **Course: MFGE 411**
College of Technology – Manufacturing Department **Fall 2009**

COURSE TITLE: Principles of Process Planning

COURSE DESCRIPTION: Process Planning is at the heart of a Manufacturing Engineers role in industry. All manufactured products require an effective process plan which thoroughly defines all manufacturing systems and processing parameters necessary for economical production of that product. This course covers those principles of process planning which are common among all products which must meet product drawing specifications. The student will be required to prepare process plans both working individually on single piece parts and as part of a process design team on complex assemblies. Examples of products to be processed are those commonly found in the automotive, aerospace, furniture, and appliance industries.

CREDIT HOURS: Four Semester Hours

CONTACT HOURS: Lecture: 3 hrs/week
Lab: 3 hrs/week

PREREQUISITES: All 300 level MFGE courses for Manufacturing Engineering Technology Majors

TEXTBOOK REQUIRED: None.

UNITS OF INSTRUCTION AND GOALS FOR EACH UNIT:

A. Understanding the Process Plan
   1. Be able to provide a written and/or verbal explanation of the role and purpose of a detailed process plan for use in manufacturing industries.
   2. Given a manufacturing process, be able to read a routing and gain an understanding of the process and its flow through a plant.
   3. Given a manufacturing operation, know what is required in terms of documentation for operator and set up personnel to successfully manufacture a part.
   4. Given a piece part's location requirements, design through the concept phase, a work holding device in sufficient detail that a detail designer could complete the design of the device.
   5. Given an operation's output, establish a process control plan that assures the customer requirements are being met.
   6. Given the need for a special gage or the alteration of a standard gage, design through the concept phase, a device t hat assures part or assembly features meet blue print requirements.
   7. Given a particular operation, know when a tooling layout is required.
   8. Be able to construct a tooling layout with the proper sequence occurring in the operation along with appropriate dimensional call outs.
   9. Be able to organize a process plan into a suitable form for presentation and use in industry.

B. Product Drawing Review
   1. Be able to review a product drawing's specifications including material, heat treatments, dimensional, finish, coating requirements, etc., for individual component parts designed for variety of purposes and made from a variety of metals, woods, glass, ceramics, plastics, etc.
   2. Understand the impact that production rate has on the interpretation of the product drawing with reference to potential manufacturing methods.

C. Propose Manufacturing Methods
   1. Given a product drawing and production rate information for that product, propose economically justifiable manufacturing methods that produce products that meet drawing specifications

D. Establish Process Dimensions and Tolerances
   1. Given a simple process, understand the need for tolerance analysis using conventional min/max tolerancing methods.

2. Given a manufacturing process, be able to represent the process on a tolerance chart following standard tolerance charting (T-charting) procedures.
3. Be able to determine which operation was responsible for establishing final blue print requirements and know how this is represented on a T-chart using standard T-charting methods.
4. Know how to determine the lines involved in a tolerance stack for a particular balance dimension.
5. Know when additional balance dimensions are required and where to place them when determining lines involved in the "stack."
6. Be able to determine "machine" to tolerances for operation lines by distributing the final blue print tolerance between appropriate lines being sure that process capability is respected in those assignments.
7. Be able to determine which lines on the T-chart require stock removal balance dimensions and which ones don't.
8. Be able to establish the tolerance for the stock removal for each operation.
9. Be able to establish a mean amount of stock allowance required in each operation to meet dimensional requirements while respecting the impact on cost in terms of material utilization, cycle time, and capability.
10. Be able to determine process dimensions and tolerances resulting from angle "cuts" on the T-chart.
11. Be able to determine process dimensions and tolerances resulting from what are known as radius break outs on the T-chart.
12. Given proposed manufacturing methods (processes) for piece parts, be able to evaluate the effect of alternate manufacturing methods on final blue print tolerances using the tolerance charting method.
13. Given a completed T-chart, be able to proof the chart by performing the operation defined in the lines involved columns to the machine-to lines and balance dimensions.
    Note: It will require many sessions and much practice to develop this skill.

E. Assembly Methods and Tolerances
1. Given component process tolerances and assembly methods, be able to predict final assembly dimensions and tolerances using a computer simulation package.
2. Given assembly performance requirements and component manufacturing process capabilities determine the best suited assembly method which may include:
    - Sort and classify (selective assembly)
    - Assemble to print based on component build tolerances
    - Assemble then calibrate assembly
3. Given the assembly method required to meet dimensional requirements, be able to economically justify that method of assembly using an appropriate economic evaluation method acceptable to the instructor.

Final grade is based upon a series of lab exercises, quizzes, individual and team projects. These will be defined by the instructor.

ATTENDANCE POLICY:

Regular attendance is <u>strongly</u> encouraged. However, absence will influence the final grade in a course only when the effects of such absence affects the student's level of competence.

GRADING SCALE:

95	-	100	=	A
93	-	94	=	A-
91	-	92	=	B+
85	-	90	=	B
83	-	84	=	B-
81	-	82	=	C+
75	-	80	=	C
73	-	74	=	C-
71	-	72	=	D+
70			=	D
69			=	D-
68			=	F

COURSE SYLLABUS

FERRIS STATE UNIVERSITY **COURSE: MFGE 421**
COLLEGE OF TECHNOLOGY **Spring 2007**
Manufacturing Department

COURSE TITLE: MFGE 421 - Automation & Systems Design

COURSE DESCRIPTION: This course is designed to familiarize the student with the design and application principles of automation commonly practiced in manufacturing industry, and develop in them expertise in applying those principles. Soft- versus hard-automation, turn-key systems versus user-constructed systems, and special- versus modular-componentry will be studied, as well as part orientation and transfer, and techniques for automating manual operations. Plant tours (if available) will illustrate applications of concepts. A special assembly machine will be designed as a term project; this will be in conjunction with the overall manufacturing facilities planning project if MFGE 422 is taken simultaneously (recommended).

CREDITS: Three Semester Hours

CONTACT HOURS: Lecture - 2 Hrs/Week
Lab - 3 Hrs/Week

PREREQUISITES: EEET 419, MFGE 411

TEXTBOOK REQUIRED: No text required

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

I. Introduction
   A. Know the course objectives, the requirements regarding attendance, grading, and overall expectations.
   B. Understand the nature of assignments and relative timing with respect to the overall course.

II. Management issues
   A. Be familiar with differing philosophies and ethical issues regarding automation.
   B. Understand the optimum timing for automation efforts.
   C. Understand the process of economic justifying automation projects.
   D. Be able to identify and discuss tangible vs. intangible benefits of automation.

III. DFMA

A. Be able to determine the number of natural orientations of piece parts.

B. Be able to calculate the required gross feed rate of a system based upon a part's number of orientations.

C. Understand common DFMA principles and be able to apply them properly to optimize the hopperability and assemblability of a part.

IV. Part Orientation Techniques

A. Understand common mechanical methods of orienting parts.

B. Understand other common methods, including pneumatic and electrical, of orienting parts.

C. Be able to develop several plans for automatically orienting any particular piece parts.

V. Part Feeding

A. Understand the place and function of orienting feeders, auxiliary feeders, tracks, escapements, placement devices, and end effectors in a parts feeding system.

B. Be able to select appropriate components for a parts feeding system based upon part characteristics, system performance requirements, and other pertinent factors.

VI. Transfer Systems

A. Understand the different workpaths that transfer systems employ.

B. Understand the different indexing schemes that transfer systems employ.

C. Be able to specify the proper workpath and indexing scheme for a transfer system based upon part characteristics, system performance requirements, and other pertinent factors.

VII. Automatable Operations

A. Be familiar with commonly-automated assembly- and fabrication operations.

B. Be able to specify the proper automated assembly- and fabrication operations based upon part characteristics, system performance requirements, and other pertinent factors.

VIII. Logic controls

A. Understand the applications and advantages of ladder logic in machine control applications.

B. Understand the options available regarding PLCs and machine control applications.

C. Be familiar with non-electrical control methods, including fluid controls.

D. Be familiar with common CIM applications, and advantages and disadvantages of various implementation methods.

IX. Modular Components

A. Understand the purpose of and proper selection considerations for actuator such as cylinders, rotary actuators, multi-motion actuators, and grippers, including safety factors.

B. Be able to properly size actuators based upon part characteristics, system performance requirements, and other pertinent factors.

C. Understand the purpose of and proper selection considerations for control components such as filters, regulators, lubricators, directional control valves, and speed/flow control valves, including safety factors.

B. Be able to properly size control components based upon part characteristics, system performance requirements, and other pertinent factors.

X. Sensors
  A. Understand the concepts of digital vs. analog sensing
  B. Be familiar with commonly used industrial sensors, including advantages and disadvantages of each.
  C. Be able to properly select sensors based upon part characteristics, system control requirements, and other pertinent factors.

XI. Robotics
  A. Understand the different geometries and control aspects of industrial robots, and how they affect selection decisions.
  B. Be able to categorize industrial robots based upon work envelope, arm type, path control, teaching methods, and other characteristics.
  C. Be aware of current state-of–the-art systems with respect to speed, repeatability, accuracy, and other pertinent factors.
  D. Be able to properly specify an industrial robot based upon part characteristics, system performance requirements, and other pertinent factors.

XII. Simulation
  A. Understand the differences between process simulation vs. design visualization.
  B. Be able to identify discrete vs. non-discrete events
  C. Be able to mathematically model discrete processes.
  D. Be able to interpret output data from a simulation and apply it to appropriate manufacturing engineering decisions.

ATTENDANCE POLICY:
Regular attendance is strongly encouraged. However absence will influence the final grade in a course when only the effects of such absence affects the student's level of competence.

Grading Scale:

95-100	A	75-80	C
93-94	A-	73-74	C-
91-92	B+	71-72	D+
85-90	B	70	D
83-84	B-	69	D-
81-82	C+	68	F

Final term grade based on:

A combination of tests, lab assignments and/or homework exercises and the term project as assigned by the instructor.

COURSE SYLLABUS

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY
Manufacturing Department

COURSE: MFGE 422
Revised Date: 11/15/02
Winter 2006

COURSE TITLE: MFGE 422 – Manufacturing Facilities Planning

COURSE DESCRIPTION: This course is designed to familiarize the student with the principles and techniques of plant layout commonly practiced in the manufacturing industry, and develop in them expertise in applying those principles. Determination of production and material handling equipment requirements, and production equipment and storage arrangement for effective product flow will be studied, as well as quantitative techniques for departmental arrangement and evaluative (deterministic and probabilistic) techniques for layout comparison. Plant tours (if available) will illustrate applications of concepts. Lab experiences culminate in a term project involving the layout of a manufacturing facility designed to produce the product from MFGE 411; this will be in conjunction with the special assembly machine project if MFGE 421 is taken simultaneously (recommended) or previously.

CREDITS: Three Semester Hours

CONTACT HOURS: Lecture - 2 Hrs/Week
Lab - 3 Hrs/Week

PREREQUISITES: MFGE 411

TEXTBOOK REQUIRED: Facilities Planning, Fourth Edition, by James Tompkins et al, (John Wiley & Co.)

EQUIPMENT REQUIRED: Laptop computer loaded with MS Office and program-provided software

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

I. Introduction
   A. Know the course objectives, the requirements regarding attendance, grading, and overall expectations.

B. Understand the nature of assignments and relative timing with respect to the overall course.

II. Process planning required for plant layout
   A. Understand what types of basic data need to be gathered before and during the manufacturing facilities planning process.
   B. Understand the different types of production facilities, and be able to select the correct type given their assignment.
   C. Know the different varieties of process planning.
   D. Understand the different meanings of plant volume.
   E. Be able to arrive at an appropriate make vs. buy decision for all components given pertinent data.
   F. Understand significant, non-significant, and hybrid part numbering systems, and their effects on plant operations.
   G. Be able to interpret and develop hierarchical bills of material.

III. Production equipment requirements
   A. Given a scrap rate and production requirements, be able to determine the number of parts to start through a facility.
   B. Given department efficiency and machine cycle times, be able to determine actual machine capability.
   C. Given the number of parts to start and actual machine capabilities, be able to determine machine quantities and space requirements
   D. Be able to compare the effects of scheduling production over general-purpose equipment vs. dedicating equipment to specific tasks.

IV. Storage requirements
   A. Know the types of storage equipment available and the various techniques of using them.
   B. Be able to coordinate storage plans to material handling schemes.
   C. Given production requirements, be able to determine storage space and equipment requirements for raw material, purchased parts, scrap/salvage, finished goods, and WIP.

V. Material handling
   A. Understand the concept of the unit load, and its advantages and disadvantages.
   B. Understand the advantages and disadvantages of the following types of material handling equipment: conveyors, industrial trucks, AGVS, cranes & hoists, and miscellaneous devices.

VI. Plant and employee services
   A. Know the support services/areas necessary and/or desirable within a facility to support production.
   B. Know the support services/areas necessary and/or desirable within a facility to support personnel.

C. Be able to determine indirect labor requirements based on expected support services.

VII. Office & personnel requirements
- A. Know key characteristics, advantages, and disadvantages of the three major office arrangement philosophies.
- B. Be able to determine salaried worker and management requirements for the projected facility.

VIII. Plant arrangement
- A. Be able to quantitatively and qualititaively determine plant activity relationships.
- B. Understand the factors that will facilitate future expansion of production and/or support services.
- C. Given space summary data and activity relationships, be able to generate a block layout.
- D. Given a block layout and other appropriate support documentation, be able to generate a plan view of a safe and efficient manufacturing facility.

IX. Environmental issues
- A. Understand key concepts regarding lighting, and be able to determine lighting source requirements for various areas within a production facility.
- B. Understand the sources of noise within a production facility, its effects on personnel, and proper noise abatement and hearing conservation techniques.
- C. Understand the short- and long-term effects of toxic substances on the human body, and proper techniques to avoid excessive exposure.
- D. Understand the factors that affect workers perception of comfort, and techniques to be able to economically provide a stable plant environment within a facility.

X. Simulation
- A. Understand the differences between process simulation vs. design visualization.
- B. Be able to identify discrete vs. non-discrete events.
- C. Be able to mathematically model discrete processes, departmental flow, and material handling systems.
- D. Be able to interpret output data from a simulation and apply it to appropriate manufacturing engineering decisions regarding manufacturing facilities planning.

TOPICAL UNIT OUTLINE AND TIME WEIGHT (IN HOURS) OF THE MAJOR UNITS OF INSTRUCTION:

I. Introduction (1 lecture, 0 lab)
   A. Course objectives and orientation
   B. Grading
   C. Nature of assignments and relative timing
II. Process planning required for plant layout (5 lecture, 3 lab)
   A. Basic data
   B. Types of production facilities
   C. Variations of process planning
   D. Plant volume
   E. Make vs. buy decisions
   F. Part numbering systems
   G. Bills of material
III. Production equipment requirements (2 lecture, 6 lab)
   A. Effects of scrap and department efficiency
   B. Determining number to start
   C. Actual machine capability
   D. Production scheduling vs. dedicated equipment
IV. Storage requirements (2 lecture, 6 lab)
   A. Types of storage
   B. Relating storage plans to material handling
   C. Determining storage requirements for raw material, purchased parts, scrap/salvage, finished goods, and WIP
V. Material handling (2 lecture, 3 lab)
   A. Unit loads
   B. Conveyors
   C. Industrial trucks
   D. AGVS
   E. Cranes & hoists
   F. Miscellaneous devices
VI. Plant and employee services (3 lecture, 3 lab)
   A. Production support services
   B. Personnel support services
   C. Indirect labor requirements
VII. Office & personnel requirements (3 lecture, 3 lab)
   A. Office arrangement philosophies
   B. Salaried worker and management requirements
VIII. Plant arrangement (3 lecture, 9 lab)
   A. Activity relationship charts
   B. Planning for expansion
   C. Block layouts
   D. Plant layouts
IX. Environmental issues (4 lecture, 0 lab)
   A. Lighting
   B. Noise

C. Toxicology
D. HVAC
E. Energy usage and conservation

X. Simulation of flow through manufacturing facilities (3 lecture, 12 lab)
  A. Process simulation vs. design visualization
  B. Discrete vs. non-discrete events
  C. Workcell and department modeling concepts
  D. Modelling material handling systems
  E. Interpreting output

XI. Testing and Review (3 lecture, 0 lab)

ATTENDANCE POLICY:

Regular attendance is strongly encouraged. However, absence will influence the final grade in a course only when the effects of such absence affects the student's level of competence.

GRADING SCALE:

95 - 100 = A	75 - 80 = C
93 - 94 = A-	73 - 74 = C-
91 - 92 = B+	71 - 72 = D+
85 - 90 = B	70 = D
83 - 84 = B-	69 = D-
81 - 82 = C+	68 = F

FINAL TERM GRADE BASED ON:

A combination of tests, lab assignments and/or homework exercises, and the term project as assigned by the instructor.

Appendix D

Perceptions of Overall Quality

Manufacturing Engineering Technology B.S.

Perceptions of Overall Quality for Academic Program Review

Brent Nienhuis - PRP member with Special Interest in the Program

On a scale of 1 –100 (with 100 representing the highest program quality achievable) rate the overall quality of the program.	90
Summarize the reason(s) for the rating assigned.	• Excellent location in Grand Rapids. • Flexible and available class times. • Practical / Hands on learning environment. • Relevant quality instruction. • Availability for non-traditional students. Degrees in the hands of experienced individuals makes for well-rounded engineers.
Outline recommended next steps to improve program quality.	• Formal process for getting feedback on curriculum from industry experts should be put in place to ensure that topics are up to date and representative of what students will expect when they enter industry. • Some topics are a bit out of date.

Manufacturing Technology (AAS) and Manufacturing Engineering Technology (BS) Programs

Evaluation. My evaluation of the Manufacturing degree programs on a 1 - 100 scale with 100 representing the highest quality achievable would be 92.

Basis of Evaluation. The Manufacturing programs evaluated as part of this Academic Program Review (APR) process were the original degree offerings of what today is the College of Engineering Technology. Because many other degree programs were developed from a Manufacturing background, the Manufacturing Technology AAS (MFGT) and the Manufacturing Engineering BS (MFGE) programs continue to provide a number of required courses for the Mechanical Engineering Technology, Product Design Engineering Technology, Plastics Engineering Technology CAD Drafting and Tool Design, Automotive Engineering Technology, Industrial Technology Management and Welding Engineering Technology programs. These courses taught for other programs are provided in addition to the classes taught for MFGT and MFGE students. Because of this dual responsibility the Manufacturing programs are often impacted by changes outside their direct control.

The two degree programs evaluated by this review, despite being interdependent upon each other, have only recently began moving toward a closely linked program identity. The Manufacturing Tooling (AAS MFGT) program has experienced solid growth from a low enrollment point approximately 8 years ago. This resurgence of interest has been driven by rapidly expanding career opportunities in advanced machining processes (CNC) and by the development of a more flexible curriculum allowing easier scheduling and integration with other College of Engineering Technology programs. The Manufacturing Engineering Technology (BS MFGE) program has an established record of very productive enrollment levels as well as a sustained history of high levels of post-graduate employment with starting salaries among the highest of Bachelor's Degree programs at FSU. The BS MFGE program is also one of only three CET programs to be successfully offered by FSU in Grand Rapids in an evening format for non-traditional students with full time employment. Both the MFGE and MFGT programs have benefitted from the increased cooperation between the two programs in the areas of curriculum development, program planning, faculty hiring and equipment acquisition.

Recommendations for Improvement. With current all current trends seemingly positive for the Manufacturing programs, I can identify no areas requiring immediate improvement. Some areas that should be considered to continue the positive changes that have been made already are;

1. Facility Improvement – The current facilities used by the Manufacturing program are not a positive or accurate reflection on the program or the profession. In some cases, excellent equipment is being used in areas with limited space, producing instructional difficulties. Within the current laboratory areas there are no facility improvements that seem practical without major renovation. There is currently a major renovation project for the Swan Building Annex that has

received final approval by the State of Michigan. It is vitally important to the future of the program that this project be successfully completed.

2. Faculty Diversification – It is likely that the Manufacturing programs will find it necessary to add faculty in the near future. Previous experience with the hiring process indicates that it will be difficult to fill these positions within salary constraints without compromising the level and quality of experience or educational qualifications. To address this potential problem area, the Manufacturing program is encouraged to continuously solicit interest among qualified potential faculty in view of potential openings. It will be important to hire faculty with at least five years of successful, relevant professional experience and to give preference to candidates with at least a technical BS degree and graduate education that includes a degree from an institution other that Ferris State.

3. Improved Waiting List Policy – The success of the Manufacturing program has created a growing demand to enroll beyond program capacity. In addition, other CET programs with poor enrollment management often use manufacturing courses to fill the schedules of pre-program students increasing the demand for manufacturing courses. Currently the program uses a first come – first served approach. While this is a fair and reasonable way to manage demand before full program enrollment, the students currently seeking admission would be better served by a strictly competitive admissions process. This would improve the program by admitting the best applicants rather than those who happen to apply early. This type of competitive admission is typical of the most selective academic programs nationwide and would raise the stature of the manufacturing programs while still providing an admission process that is fair to all. The Manufacturing programs must also rigorously manage enrollment in MFGE and MFGT courses to ensure that critical capacity is not being used to support students from other programs that are in a pre-program status.

4. Merge MFGT & MFGE – Since the AAS and BS programs are essentially a 0-4 program in Manufacturing, it is expected that they will continue to have common interests. It is recommended that Manufacturing programs merge their budgets and faculty groups into a single entity. While this is not an easy step because of years of historic separation, such a merger would provide increased flexibility and encourage focus on common objectives that would benefit both programs.

5. Improved Laboratory Staffing Strategy for MFGT – There are a number of laboratory sections in MFGT programs that could be conducted using non-tenured faculty. While the lecture portion and the laboratory content of a course should remain the responsibility of tenured program faculty, many MFGT laboratory sections would be more effectively conducted by technical staff rather than faculty. While this will not be easy to implement, it would provide for well supported laboratories while allowing tenured faculty resources to concentrate on course content.

Improved Implementation of Laptop PCs – Currently MFGT & MFGE programs both require students to have a student owned laptop computer. Unfortunately, due to a variety of reasons, the use of student owned laptop PCs has been spotty in the Manufacturing courses. The manufacturing programs should make a renewed effort to insist that the required student PCs are used in all computer based activities in program courses. It is acknowledged that that this may require changes in the software used and its licensing however it is believed that suitable alternatives exist that would allow a complete implementation while continuing to meet course objectives. Only a more complete implementation of student owned laptop PCs would provide all the benefits identified when this requirement was originally implemented.

Richard F. Goosen PE, PhD
Director
School of Design & Manufacturing
College of Engineering Technology

ACADEMIC PROGRAM REVIEW

Manufacturing Engineering Technology - AAS & BS Programs

Perceptions of Overall Quality

Dean Rating – 92%

Rationale:

- These programs provide education in manufacturing concepts that are always in demand. These concepts include how to make products better, faster, safer, and less expensive. The student develops strong analytical and problem solving skills through classroom theory and laboratory hands-on implementation. Students procure high paying and high performance level positions upon graduation, and are in high demand in Michigan as well as across the nation. There also exists a high demand for these graduates within many international companies.
- There are two concentrations that a student may follow, the tooling track or the processing track. This assists in recruiting a wider range of students
- The graduates from this program have numerous job offerings immediately. Companies that pursue the graduates are among the leaders in a wide range of industries. This includes automotive, equipment, machinery, defense, etc.
- The program curriculum is diverse. It includes foundational courses within the first year and advances into applied practical engineering courses. The program prepares students for a very broad range of occupations and how to deal with manufacturing engineering challenges found daily in industry. All of the faculty have extensive, applicable industry experience. Faculty currency is kept by attendance to seminars, membership to professional engineering societies, and working with companies throughout the year. The same diverse group of companies that hire the graduates also repeatedly take program interns, a degree requirement. Faculty visit and monitor the interns as coordinators. This also aids in the currency and updating of faculty knowledge.
- The program uses TracDat assessment software to create, house, monitor and manage curriculum outcomes and assessment methods. The coordinator of the programs is a current tenured faculty member. In rotating faculty through this position, they share in program administrative duties and issues. This assists in understanding and consensus gaining with decisions that support program quality and keep it student focused.
- This program demonstrates its value to the university through attracting an abundance of students who represent a high level of academic ability. As such, the program enrollment trend along with its retention rate are both upward and high. The graduates bring notoriety back to the program, college, and university. This notoriety is due to the graduates having a solid technical background which allows them to solve a broad array of problems in areas such as design, testing, and manufacturing. This leads to an increasing amount of students entering the programs.

Improvement Recommendation:

- The updating and new facilities construction of the laboratory and educational spaces need a foundational maintenance plan for state-of-the-art appearance and functionality with an emphasis on cleanliness.
- Continue curriculum improvements and enhancements through the utilization of data and self-studies.
- Eliminate the program wait list and create student flexibility as the building activities occur.

Larry Schult

Dean, College of Engineering Technology

Appendix E

TracDat Data

Program - Manufacturing Engineering Technology (B.S.) - Mapping: Curriculum Mapping														
Legend: (A) - Program Assessment, (I) - Introduced, (M) - Mastery, (R) - Reinforced														
Outcomes	**MFGE 311**	**MFGE 312**	**MFGE 321**	**MFGE 322**	**MFGE 324**	**MFGE 326**	**MFGE 341**	**MFGE 342**	**MFGE 393**	**MFGE 411**	**MFGE 421**	**MFGE 422**	**MFGE 423**	**MFGE 442**
Industrial engineering skills	I				R				R	R	M	M		
Quality Skills			I		R		I	R	R					M
Professional Development					I				M					
Employable skills	I	I	I		R		I	R	R	M			R	R
Collaboration	I	I	R	R	R		I	R	R	M				R
Problem Solving	I		R	R	R	R	I	R	R	R	M	M	R	R
Process Skills	I	I		I	R	I				M				
07/26/2016 4:54														

Assessment: Program Four Column

Program - Manufacturing Engineering Technology (B.S.)

Mission Statement: The mission of the Manufacturing Engineering Technology program is to prepare career ready manufacturing engineering professionals to serve Michigan and the nation in a global economy.
Advisory Board/Committee Meetings: Once per year
Next FSU Academic Program Review: 2016-2017
Accreditor Body: None
College: CET

Outcomes	Assessment Methods	Results	Actions
Industrial engineering skills - Students will be able to design manufacturing systems that produce products that meet or exceed design and quality requirements with the minimum expenditure of resources **Outcome Status:** Active **Planned Year(s) of Assessment:** 2016 - 2017 **Start Date:** 01/11/2016	MFGE 421 Final Grade **Criterion for Success:** 80% of all students will receive at least a 70% in	**Reporting Period:** 2015 - 2016 **Classification:** Criterion Met 24 or 27 students (89%) received a 70% or better in MFGE 421 (05/13/2016)	
		Reporting Period: 2014 - 2015 **Classification:** Criterion Met 38 of 41 students (93%) received a 70% or better in MFGE 421 (05/08/2015)	
		Reporting Period: 2013 - 2014 **Classification:** Criterion Met 13 of 13 students (100%) received a 70% or better in MFGE 421 (05/09/2014)	
		Reporting Period: 2012 - 2013 **Classification:** Criterion Met 36 of 36 students (100%) received a 70% or better in MFGE 421 (05/10/2013)	
		Reporting Period: 2011 - 2012 and Prior **Classification:** Criterion Met 17 of 18 students (94%) received a 70% or better in MFGE 421 (05/11/2012)	
		Reporting Period: 2011 - 2012 and Prior **Classification:** Criterion Met	

Outcomes	Assessment Methods	Results	Actions
		26 of 26 students (100%) received a 70% or better in MFGE 421 (05/13/2011)	
Quality Skills - Students will be able to develop proper measurement systems and demonstrate the ability to apply statistical tools for the purpose of manufacturing process improvement **Outcome Status:** Active **Planned Year(s) of Assessment:** 2016 - 2017 **Start Date:** 01/11/2016	MFGE 442 final grade **Criterion for Success:** 80% of all students will receive at least a 70% in	**Reporting Period:** 2015 - 2016 **Classification:** Criterion Met 66 of 70 students (94%) received a 70% or better in MFGE 442 (12/18/2015) **Reporting Period:** 2014 - 2015 **Classification:** Criterion Met 80 of 82 students (98%) received a 70% or better in MFGE 442 (12/19/2014) **Reporting Period:** 2013 - 2014 **Classification:** Criterion Met 67 of 70 students (96%) received a 70% or better in MFGE 442 (12/20/2013) **Reporting Period:** 2012 - 2013 **Classification:** Criterion Met 38 of 42 students (91%) received a 70% or better i n MFGE 442 (12/14/2012) **Reporting Period:** 2011 - 2012 and Prior **Classification:** Criterion Met 30 of 32 students (94%) received a 70% or better in MFGE 442 (12/16/2011)	
Professional Development - Students will conduct themselves and communicate in a way that is consistent with a manufacturing professional **Outcome Status:** Active **Planned Year(s) of Assessment:** 2017 - 2018 **Start Date:** 01/11/2016	**Internship Evaluation -** Graded internship reports **Criterion for Success:** 80 % of students will score 70% or better	**Reporting Period:** 2014 - 2015 **Classification:** Criterion Met 32 of 32 students received a 70% or better in the internship (08/14/2015) **Reporting Period:** 2013 - 2014 **Classification:** Criterion Met 30 of 30 students received a 70% or better for their internship (08/15/2014) **Reporting Period:** 2012 - 2013 **Classification:** Criterion Met 14 of 14 students received a 70% or better for their internship (08/15/2013) **Reporting Period:** 2011 - 2012 and Prior **Classification:** Criterion Met	

Outcomes	Assessment Methods	Results	Actions
		21 of 21 students received a 70% or better for their internship (08/10/2012)	
		Reporting Period: 2011 - 2012 and Prior **Classification:** Criterion Met 18 of 18 students received a 70% or better for their internship (08/12/2011)	
		Reporting Period: 1 - No Action Required **Classification:** Criterion Met As of this date, 13 of 15 (87%) students enrolled in the Manufacturing internship (MFGE 393, Summer 2009) have scored better than 75% (95%). The remaining 2 students are completing assignments, and have received incompletes. Supervisor ratings have been excellent. (09/17/2009)	
Employable skills - Students will demonstrate the application of skills that are attractive to potential employers **Outcome Status:** Active **Planned Year(s) of Assessment:** 2017 - 2018 **Start Date:** 01/11/2016	Graduate placement rate **Criterion for Success:** 95% of all graduates are employed in field after graduation **Assessment Schedule:** Fall Semesters	**Reporting Period:** 2015 - 2016 **Classification:** Criterion Met 100% of surveyed students are currently employed in the manufacturing or quality field (04/20/2016)	
Collaboration - Students will be able to work with their peers in order to accomplish manufacturing engineering tasks. **Outcome Status:** Active	MFGE 411 Final Grade **Criterion for Success:** 80% of students will receive a 70% or better	**Reporting Period:** 2015 - 2016 **Classification:** Criterion Met 24 of 28 students (86%) received a 70% or better in MFGE 411 (12/18/2015)	
		Reporting Period: 2014 - 2015 **Classification:** Criterion Met 42 of 42 students (100%) received a 70% or better in MFGE 411 (12/12/2014)	
		Reporting Period: 2013 - 2014 **Classification:** Criterion Met 12 of 13 students (92%) received a 70% or better in MFGE 411 (12/13/2013)	
		Reporting Period: 2012 - 2013 **Classification:** Criterion Met 33 of 33 students (100%) received a 70% or better in MFGE 411 (12/14/2012)	

Outcomes	Assessment Methods	Results	Actions
		Reporting Period: 2011 - 2012 and Prior **Classification:** Criterion Met 19 of 19 students (100%) received a 70% or better in MFGE 411 (12/16/2011)	
Problem Solving - Students will demonstrate problem solving skills **Outcome Status:** Active	MFGE 422 Final Grade **Criterion for Success:** 80% of students will receive a 70% or better	**Reporting Period:** 2015 - 2016 **Classification:** Criterion Met 26 of 30 students (87%) received a 70% or better in MFGE 422 (05/13/2016)	
		Reporting Period: 2014 - 2015 **Classification:** Criterion Met 36 of 41 students (88%) received a 70% or better in MFGE 422 (05/08/2015)	
		Reporting Period: 2013 - 2014 **Classification:** Criterion Met 13 of 13 students (100%) received a 70% or better in MFGE 422 (05/09/2014)	
		Reporting Period: 2012 - 2013 **Classification:** Criterion Met 36 of 36 students received a 70% or better in MFGE 422 (05/10/2013)	
		Reporting Period: 2011 - 2012 and Prior **Classification:** Criterion Met 17 of 18 students (94%) received a 70% or better in MFGE 422 (05/11/2012)	
		Reporting Period: 2011 - 2012 and Prior **Classification:** Criterion Met 27 of 27 students (100%) received a 70% or better in MFGE 422 (05/13/2011)	
Process Skills - Students will be able to develop and improve manufacturing processes **Outcome Status:** Active **Planned Year(s) of Assessment:** 2016 - 2017 **Start Date:** 04/11/2016	MFGE 324 Final Grade **Criterion for Success:** 80% of students will receive a 70% or better	**Reporting Period:** 2015 - 2016 **Classification:** Criterion Met 46 of 46 students (100%) received a 70% or better in MFGE 324 (05/13/2016)	
		Reporting Period: 2014 - 2015 **Classification:** Criterion Met 28 of 28 students (100%) received a 70% or better in MFGE 324 (05/08/2015)	

Outcomes	Assessment Methods	Results	Actions
		Reporting Period: 2013 - 2014 **Classification:** Criterion Met 44 of 44 students (100%) received a 70% or better in MFGE 324 (05/09/2014)	
		Reporting Period: 2012 - 2013 **Classification:** Criterion Met 11 of 12 students (92%) received a 70% or better in MFGE 324 (05/10/2013)	
		Reporting Period: 2011 - 2012 and Prior **Classification:** Criterion Met 36 of 36 students (100%) received a 70% or better in MFGE 324 (05/11/2012)	
		Reporting Period: 2011 - 2012 and Prior **Classification:** Criterion Met 19 of 19 students (100%) received a 70% or better in MFGE 324 (05/13/2011)	