

Graduate Degree Addition
Master of Science in Mechanical Engineering (MSME)
Weisberg Division of Engineering
Marshall University
Proposed Implementation Date: Fall 2015

Dr. Asad A. Salem
March 27, 2015

Master of Science in Mechanical Engineering (MSME)
Weisberg Division of Engineering

Brief Program Description:

This is a Graduate Degree Addition for a Master's of Science in Mechanical Engineering Program (MSME) by the Weisberg Division of Engineering of the College of Information Technology and Engineering (CITE) to graduate mechanical engineers for meeting West Virginia's increasing technological demands. Graduates of this Program will contribute to West Virginia's economic development, advance its competitive edge globally and contribute to improvement in the quality of life.

A master's degree in mechanical engineering (MSME) provides additional breadth and depth of knowledge, positioning graduates for technical leadership and specialization in industry. Candidates develop skills such as analysis, resourcefulness, ingenuity, responsibility and perseverance through research activities. The proposed MSME will significantly increase graduate students enrollment at Marshall University from local, national and international sources. The INTO program recruiters in China and India have indicated that they can recruit large number of students to study MSME at Marshall University once the program is in place. The MSME will enable the introduction of an Accelerated Master's Degree (AMD or 4+1) program in BSME. AMD allows outstanding undergraduate students to complete a traditional four-year Bachelor's degree in Mechanical Engineering and then, with one additional year, earn a Master's degree. AMD will help attract more highly motivated undergraduate students to Marshall University. The MSME degree program is essential to attract and retain qualified faculty members in ME. Also, research is an integral part of a faculty member's career to stay abreast in a rapidly evolving field such as ME. MSME program is critical to helping faculty members stay current and also contributes to keeping the BSME program current and relevant.

This proposed MSME program is to be established on the foundation of the currently under-review BSME program. Therefore, both programs are to share the same resources. The program will cost approximately \$2.4 million during its first five years, of which about \$150,000 will be used to develop needed laboratories. The program is expected to generate \$3.6 million in revenues during the first five years. Enrollment is expected to increase over this period; it is expected that, after the first five years, 45 students will have graduated with a MSME degree and approximately 72 students will be actively pursuing a MSME degree at MU.

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1. Rationale for the New Degree Program

1.1 Market Demand

This is an application for a Master's of Science in Mechanical Engineering Program MSME by the Weisberg Division of Engineering of the College of Information Technology and Engineering (CITE) to prepare mechanical engineers for meeting West Virginia's increasing technological demands. Graduates of this Program will contribute to West Virginia's economic development, advance its competitive edge globally and contribute to improvement in the quality of life.

Mechanical Engineering is an engineering discipline that requires an understanding of mechanics, kinematics, thermodynamics and energy, and involves the application of principles of physics and mathematics to develop mechanical systems. The American Society of Mechanical Engineers (ASME) defines mechanical engineering as: the branch of engineering that serves society through the analysis, design, and manufacture of systems, at all size-scales, that convert a source of energy to useful mechanical work. In 2004, the ASME noted in its publication, "A Vision of the Future of Mechanical Engineering Education," that mechanical engineering education was "changing" in order to address "societal concerns." The discipline is very broad, encompassing elements of these areas: energy science and technology, sustainability, propulsion, sensing and control, nanomaterials, nano- and micro-mechanics, design mechatronics, computational simulation, solid and fluid dynamics, manufacturing, micro-electromechanical systems (MEMS), and biomechanical engineering.

The U.S. Bureau of Labor projected a 5-8 percent increase in the national demand for mechanical engineers and closely related fields (manufacturing and materials) between 2012 and 2022. The demand for mechanical engineers with expertise in the design and development of mechanical systems for occupational safety and biomedical applications is projected to increase 13% nationally over the same period. The demand for engineers with expertise in the design of mechanical systems associated with alternative fuels and renewable energy is projected to increase 12% nationally in the next 10 years.

According to *U.S. News & World Report*, workers with master's degrees generally earn higher salaries than workers with less education (i.e bachelor). The Census Bureau data show us that typically mechanical engineers with master's degrees earn about \$10,000-12,000 more a year (roughly, 15 percent) than those just having a bachelor's degree. Master's degree holders will generally start at a higher compensation level and progress faster in their careers. Data from ASME and ASCE for mechanical and civil engineers shows the increase above median annual income earned by a Bachelor's degree is 11-19 percent for a Master's. The U.S. Bureau of Labor Statistics (BLS) also noted that careers that require a master's degree to enter the field are projected to see the most job growth from 2012-2022. Advancement opportunities can include moving into managerial or administrative positions and obtaining licensure and certification.

A master's degree in mechanical engineering is often necessary to land certain jobs or for career

advancement within certain disciplines of mechanical engineering. Many careers that require master's degrees are typically found in sectors such as research and product development. Mechanical engineers with a master's degree often benefit from higher pay and increased job responsibilities. While the technical abilities are essential, employers value Master's holders for their organization, independence, problem solving, fast learning, commitment, flexibility, and leadership and communication skills.

A master's degree in mechanical engineering provides additional breadth and depth of knowledge, positioning graduates for technical leadership and specialization in industry. Candidates develop skills such as analysis, resourcefulness, ingenuity, responsibility and perseverance through research activities. These skills make employees more successful and give them greater opportunity to work on more interesting projects. In the longer term, these skills are more important than the specialty, and the better skills of Master's degree holders will serve them well. U.S. data (across all areas of engineering) show that the unemployment rate for Bachelor's degree holders is 4.5% and for Master's degree holders it is 3.0%.

The economy of the future will be driven by innovation and knowledge. R&D to fuel innovation is largely conducted by graduate degree holders, yet the USA in general and West Virginia in particular lags seriously in producing them. The USA ranks 14th in the world for the fraction of its population graduating with a graduate degree (behind almost every other industrialized country a relatively smaller fraction is in engineering than is typical of peer nations. The need to take actions for maintaining technological leadership of the United States is progressively becoming more urgent. Developing cutting-edge technology through cultivating innovation is critically important in the global competitive environment. Engineering education is one of the most important aspects of this innovation-cultivating process. Many states are now recognizing a shortage of engineers and are taking actions to address this urgent problem.

Enrollment of engineering in Master's degrees grew to about 113,000 in 2013, representing a 6 percent above the previous year. In the 2012-13 academic year, there were 23554 students enrolled in MSME programs and related fields nationwide (Engineering Enrollment 2012-13, www.asee.org/college) at a rate of 71 per million capita. The total enrollment in state supported MSME programs in West Virginia was estimated to be 85 students in Fall 2013 at a rate of 44 per million capita—27 per million lower than the national average.

1.2 Strategic Importance

Given the above backdrop and especially the opportunities unfolded by renewable energy, bio and hydro-carbon fuels, sustainability, nanomaterials and biotechnology, introducing an MSME degree at Marshall University is of strategic importance for the following reasons:

- There is only one Mechanical Engineering Master's Degree program in the state of West Virginia], which is located at the West Virginia University. Given the high demand for Mechanical Engineering (ME) graduate education and excellent job opportunities, there is a need for an additional master's programs to serve the southern West Virginia and Tri-State region population.

- The Marshall University Bachelor of Science in General Engineering (BSE) recent graduates have gone to other institutions such as the Ohio State University, University of Michigan, Purdue University, and others to pursue graduate studies in engineering. Once West Virginia students leave the state to pursue graduate engineering degrees elsewhere, they are less likely to come back to the state after graduation. An MU MSME program will help to keep more of West Virginia ME students in the state.
- Given the rapid advances in the mechanical engineering (ME) discipline, an MSME degree program is essential for providing BSME students an educational experience that reflects current advances and practices in the field. The MSME program provides a research-oriented academic environment that helps to attract more students into the BSME program. BSME and MSME programs complement each other and they are like *Yin and Yang* as attested by their co-existence in almost all broad-based universities in the US.
- The MSME will enable the introduction of an Accelerated Master's Degree (AMD or 4+1) program in BSME. The AMD allows outstanding undergraduate students to complete a traditional four-year Bachelor's degree in Mechanical Engineering and then, with one additional year, earn a Master's degree. The AMD will help attract more highly motivated undergraduate students to Marshall University.
- The MSME degree will significantly increase graduate student enrollment at Marshall University through both direct and INTO program channels. The INTO program recruiters in China and India have indicated that they can recruit large number of students to study MSME at Marshall University once the program is in place. This is not surprising given the current and future ME job growth rates in the US and globally.
- The MSME degree program is essential to attract and retain qualified faculty members in ME. Also, research is an integral part of a faculty member's career to stay abreast in a rapidly evolving fields such as ME. The MSME program is critical to helping faculty members stay current and also contributes to keeping the BSME program current and relevant.
- Even at the current research activity level at Marshall University, MSME graduate students will be able to help advance collaborative research opportunities for MU faculty by effectively utilizing advanced computational and analytical research tools. Especially faculty of School of Medicine and bio-medical fields. The MSME program will contribute to interdisciplinary research at Marshall University.
- With shrinking state financial support to Marshall University, it is critical that academic departments acquire advanced and specialized laboratory instruments to support instruction through external funding. The MSME degree program will help in making proposals more competitive.

1.3 Five-Year Enrollment Projection

Assuming a Fall, 2015 start date, the Table below shows projected MSME program enrollment growth during the first five years. This is a very conservative estimate. Furthermore by design,

enrollment will be capped at the levels shown in the table so that the program can be offered without additional faculty resources.

Under a typical scenario, it will take four semesters to fulfill the MSME degree requirements. Students will complete 9 hours of course work during each of the first two semesters, 6 hours of course work and initial thesis work during the third semester, and dedicate the fourth semester to completing thesis research. Another scenario is 9 hours of course work during each of the first three semesters, and completion of comprehensive project during the fourth semester.

In steady state, the program requires offering 9 courses per academic year and maximum enrollment per section will be capped at 20. The lab fee generated through the courses will be used to fund graduate teaching assistants who will help the professors in grading assignments and exams.

If the US Bureau of Labor Statistics projections were to hold true, the program can easily grow to a level where 15-20 students graduate every year. Offering 9 graduate courses per academic year requires 1.5 FTE faculty. The goal is to kick-start the program with only minimal additional faculty resources and providing the university administration the option to grow the program with additional faculty resources.

MSME Program Five-Year Enrollment Projection

	New Students	Attrition	Graduation	Cumulative Head Count	Cumulative FTE
1 st year 2015-16	18	0	0	18	18
2 nd Year 2016-17	24	2	0	40	40
3 rd Year 2017-18	25	3	10	52	52
4 th Year 2018-19	30	3	15	56	56
5 th Year 2019-20	40	4	20	72	72

1.4 Expenses and Revenue Projection

No additional faculty will be needed to support this program. As it was mentioned earlier, this proposed MSME program as well as the currently under-review BSME program will share faculty and resources and students as well (in case of the accelerated BSME/MSME program). It is neither practical nor possible to accurately assess the financial impact of the MSME program in the absence of the BSME program. Therefore, a pro-forma model analysis was done for both programs (Appendix B). It was assumed that MSME anticipated cost and revenues are 25% of the total cost and revenues of combined programs. The listed table shows the MSME portion:

Five-Year Costs		Five-Year Funding	
Personnel ¹	\$1,295,000	Reallocated Funds ²	\$545,000

Equipment	\$150,000	Anticipated State Funding	\$0.0
Program Start-up/ Development (Including Library Cost)	\$329,000	Special Item Funding (Industry Support) Research	\$150,000 \$150,000
Annual Operating Expenses	\$656,000	Tuitions & Fees	\$2,793,000
Total Costs	\$2,430,000	Total Funding	\$3,638,000
1. Includes costs for new faculty hires, adjuncts, reallocated faculty time, program administration, and clerical and technical support personnel. For new faculty and reallocated faculty, individual salaries are prorated as a percentage of the time assigned to the program. 2. Reallocated funds are from faculty and staff salaries that will be assigned to the program.			

2. Additional Resource Requirements

The proposed MSME program is to be established on the foundation of the currently under-review BSME program. Therefore, both programs are to share same resources. However, the MSME degree program will require some additional resources due to the nature and scope of the proposed program. These additional resources fall into four primary categories: physical infrastructure, research support, student support, and faculty.

2.1 Physical Infrastructure

The Weisberg Division of Engineering will be housed in the Arthur Weisberg Family Applied Engineering Complex, a new building which is under construction (expected occupancy: Spring/Summer, 2015). Adequate space for faculty offices, classrooms, and computer labs has been provided in the new building for the current and near-term Engineering division needs.

Though the MSME program primarily targets INTO program students and local/regional full-time students, some MSME courses will be offered in the evenings to accommodate working professionals. The schedule for evening courses will be rotated in such a way to enable working professionals to earn a MSME degree. These courses will also help reduce contention for classrooms during peak hours. Therefore, no additional physical infrastructure is needed.

2.2 Research & Students Support

The Division has five laboratories that are associated with the existing engineering program. Most of these facilities can be utilized as associated mechanical engineering laboratories with the proper equipment complement. The needed labs for the BSME will require approximately 20,000 sq. ft. of additional teaching laboratory space as well as additional appropriate support staff. All needed space will be accommodated in the Weisberg Family Applied Engineering Complex and Weisberg Engineering Lab.

More specialized and research grade equipment will be needed to have state-of-the-art laboratories to support the research initiatives. Local industries and the community are expected to raise \$600,000-1,000,000 for equipment, scholarships, and other start-up costs for the new mechanical engineering program.

The total projected, therefore, for the research labs is \$150,000. About \$45,000 of the required funds will be in form of start-up support for the new faculty (new faculty member usually receives about \$30,000 as start-up fund).

During the infancy phase, the MSME program requires financial support in terms of graduate assistantships to attract over-achieving students. These assistantships should come in the form of tuition benefits and stipends (20 hours/ Week). Therefore, it is anticipated that the program will be awarded a total of three full graduate assistantships per year for the first three years of the program. The estimated cost of such support is about \$29,000 per year.

2.3 Faculty Resources and Teaching Load Mapping

As it was mentioned earlier, this proposed MSME program is to be established on the foundation of the currently under-review BSME program. Therefore, no additional faculty will be needed to support this program. The following table shows a typical faculty course load when the program is fully staffed and implanted.

The listed tables to provide information about Core and Support faculty. An asterisk (*) indicates the individual who will have direct administrative responsibilities for the program.

Name of <u>Core</u> Faculty and Faculty Rank	Highest Degree	Courses Assigned in Program	% Time Assigned To Program
Salem, Asad * Professor [Primary responsibility for administering the program]	PhD in Mechanical Engineering (Energy & Thermal Science)	ME520,530, 601,625,650, 685 & 690	25%
Chen, Gang Associate Professor	PhD in Mechanical Engineering (Dynamical Systems)	ME- 515, 604,635, 640, 685 & 690	25%
Hijazi, Iyad Assistant Professor	PhD in Mechanical Engineering (Materials)	ME -550, 601,602, 620, 625,685 &690	25%
Sadique, Serdar Assistant Professor	PhD in Mechanical Engineering (Manufacturing)	ME- 601, 602, 615, 630, 685 &690	25%

New Faculty (I) in Year 2016	PhD in Mechanical Engineering (Design)	ENGR -570, ME:560, 601, 602, 604, 685 &690	25%
New Faculty (II) in Year 2016	PhD in Mechanical Engineering (Thermo-Fluids)	ME- 520, 530, 650, 685 & 690	25%
New Faculty (III) in Year 2016	PhD in Mechanical Engineering (Controls)	ME -601, 602, 604, 640, 685 &690	25%

Annual Course Schedule to Meet MSME Requirements

	Fall	Spring
Year I	ME-601* ME-604 ME-685** ME-690** Three Elective Courses	ENGR-570 ME-602* ME-685** ME-690** Three Elective Courses
Year II	ME-601* ME-604 ME-685** ME-690** Three Elective Courses	ENGR-570 ME-602* ME-685** ME-690** Three Elective Courses
<p>*ME-601 & ME-602 are a sequence</p> <p>** ME-685 (Design Project) & ME-690 (Thesis) will be offered based on students and faculty interests.</p>		

The BSME/MSME Projected Faculty Course Load in 2016-2017

Faculty	Fall 2016					Spring 2017				
	ENGR	BSME	MSME	Total SCH	Total Cont. Hrs	ENGR	BSME	MSME	Total SCH	Total Cont. Hrs
Chen	3	3	3	9	9	0	5	3	8	9
Hijazi	3	3	3	9	9	4	3	0	7	9
Sadique	6	3	0	9	9	0	6	3	9	11
Salem	1	3	3	7	9	0	3	3	6	6
Mechatronics*	7	0	0	7	8	3	3	3	9	10
TOTAL (BSME/MSME)	20	12	9	41	44	7	20	12	39	45
*New faculty as a replacement to Dr. Bill Pierson in the area of Mechatronics- Active faculty search										

From the above listed table, it is noticed that during a typical academic year the average teaching load for a designated BSME faculty is 13.0 SCH of undergraduate related courses/ year (15.2 Contact Hours) and 5.0 SCH of graduate related course/ year to a total of 18.0 SCH/ year. Therefore, the faculty will have 25% time release to pursue their research interests

3 Non-Duplication

The new MSME degree program does not duplicate any existing graduate programs.

4 New Catalog Description

4.1 Program Description

The Master of Science in Mechanical Engineering (MSME) degree is designed to provide students with the knowledge, skill, and professional practices needed to develop and design mechanical engineering related systems. The program also prepares students who desire to pursue further graduate work leading to a Ph.D. degree.

4.2 Admission Requirements

Applicants should follow the admissions process described in this catalog or at the Graduate Admissions website: <http://www.marshall.edu/graduate/admissionsrequirements.asp>. Each applicant for admission to the M.S. in Mechanical Engineering degree program must have an undergraduate engineering degree from either an accredited ABET curriculum or an internationally recognized program and meet *one* of the following (A, B, or C) admission requirement options:

- A. Pass the PE exam, or
- B. Have an undergraduate cumulative GPA of 3.00 or greater, or

- C. Have an undergraduate cumulative GPA of 2.50 or greater, and satisfy at least two of the following:
 - (1) Pass the FE exam,
 - (2) verbal GRE score at least 145,
 - (3) quantitative GRE score at least 150, and/or
 - (4) analytical writing GRE score at least 3.0.

Additionally, to be considered for admission, international students must have an iBT TOEFL score of at least 85, or a Paper-Based TOEFL score of at least 527.

Students who do not meet admission requirement options A, B, or C are welcome to apply, and their applications will be considered for admission on a case by case basis. The program admission recommendation will be decided by the MSME degree program coordinator based on a combination of GRE scores and level of performance in undergraduate engineering coursework.

Applicants who do not meet the above criteria but have an undergraduate engineering degree are welcome to apply as non-degree seeking students and take classes toward their MSME degree. If the student has a minimum cumulative graduate GPA of 3.30 in his or her first 9 credit hours of CITE MSME courses, that student may re-apply to the university to be considered for admission to the MSME degree program.

Eligibility to take the PE exam is based primarily on completion of an ABET accredited undergraduate engineering degree in most states. Completion of a MSME graduate degree at an institution with an ABET-accredited undergraduate degree does not fulfill that requirement to take the PE exam.

4.3 Degree Requirements

Each degree candidate is required to complete at least 30-33 graduate credit hours, depending on the “option” chosen below (project, thesis, or coursework only), with a cumulative Grade Point Average of 3.0 for the courses included in the student’s Plan of Study. At least one-half of the minimum required hours for the degree must be earned in classes numbered 600 or above.

Each degree-seeking student must file an approved “Plan of Study,” developed with a faculty advisor, before the student registers for the 12th credit hour. The Academic Regulations portion of the Graduate Catalog may be consulted for additional information. The Plan of Study should define a Focus Area for the individual student that is related to the student's technical and professional development interests. Focus areas include sustainability, materials and manufacturing, bio-mechanical engineering, thermo/fluids, and mechanics/design. At least three of the Elective Courses (9 CR) must be within the student’s Focus Area at the 600-level.

Students may choose to complete either the “project option,” the “thesis option,” or the “coursework only option” after consultation with their academic advisor.

Project Option (30 hours). The comprehensive project involves the application of coursework completed as part of the degree to a practical problem. Students will work with their advisor to identify an appropriate project and scope. Students must prepare a formal written report and deliver an oral presentation to a committee. Students register for ENGR 699 Comprehensive Project (3 HR) during the semester in which their project will be completed and presented, but preliminary work on the project may commence before that semester.

ENGR 570	Finite Element Analysis.....	3 hrs
ME 601	Advanced Engineering Analysis I.....	3 hrs
ME 602	Advanced Engineering Analysis II (or ENGR 610 with advisor approval).....	3 hrs
ME 604	Research Methods.....	3 hrs
Five (5) Elective Courses.....		15 hrs
ENGR 699	Comprehensive Project	3 hrs

Thesis Option (30 hours). The thesis option involves the completion of 6 HR of research (ENGR 681) under the direction of an advisor on an approved project. The student must prepare a formal thesis proposal (including a statement of work, extensive literature search, and proposed timeline) in consultation with their advisor and present the proposal to their graduate thesis committee, which is formed in consultation with their advisor. The thesis proposal must be defended and approved by the thesis committee prior to the final semester of study (typically completed during first semester of ENGR 682). Students must then summarize their research work in the form of a formal, written thesis and successfully defend it before their thesis committee in order to fulfill the requirements for the degree (typically completed during second semester of ENGR 682). Thesis work is typically conducted over two semesters.

ENGR 570	Finite Element Analysis.....	3 hrs
ME 601	Advanced Engineering Analysis I.....	3 hrs
ME 602	Advanced Engineering Analysis II (or ENGR 610 with advisor approval).....	3 hrs
ME 604	Research Methods.....	3 hrs
Four (4) Elective Course		12 hrs
ENGR 682	Research	6 hrs

Coursework Only Option (33 hours). Students can complete 33 hours of coursework and then complete a comprehensive examination within the last two semesters of graduation to fulfill the requirements of their degree. Examinations will be administered once per semester for all students.

ENGR 570	Finite Element Analysis.....	3 hrs
ME 601	Advanced Engineering Analysis I.....	3 hrs
ME 602	Advanced Engineering Analysis II (or ENGR 610 with advisor approval).....	3 hrs
Eight (8) Elective Courses.....		24 hrs

Approved Elective Courses

Any ME (Mechanical Engineering) course approved in advance by the student's advisor

Any CE (Civil Engineering) course approved in advance by the student's advisor

Any EM (Engineering Management) course approved in advance by the student's advisor

Any ENGR (Engineering) course approved in advance by the student's advisor

5. Summary of Courses in MSME Degree

Existing Courses

ENGR 610- Applied Statistics
ENGR 685-88- Independent Study
ME 601- Advanced Engineering Analysis I
ME 604- Research Methods

Existing Courses being Modified (proposal submitted concurrently)

The following course modification has been submitted to the Graduate Council for Approval:

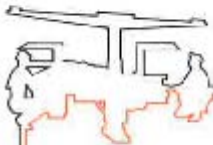
ENGR 570 – Finite Element Analysis (being changed from CE 615 Finite Element Applications)

New Courses (proposals submitted concurrently)

The following course additions have been submitted to the Graduate Council for Approval:

ME 515- Vehicle Dynamics
ME 520- Introduction to Computational Fluid Dynamics
ME 530-Renewable Energy
ME 545- Nano-Materials
ME 560 -Automation and Control
ME 602- Advanced Engineering Analysis II
ME 617 -Additive Manufacturing
ME 621 -Corrosion Engineering
ME 625- Tribology
ME 628- Applied Biomaterials
ME 630- Manufacturing Systems
ME 635- Advanced Vibrations
ME 640- System Modeling
ME 645- Nonlinear Dynamics
ME 649 -Sustainable Energy Management
ME 650-653- Special Topics
ENGR 682- Research
ENGR-699- Comprehensive Project

Appendix A
Letters of Support



J. H. FLETCHER & CO. Box 2167 — Huntington, WV 25722-2167 — 304/525-7611 — FAX 304/525-9770

September 8, 2014

Subject: Marshall Letter of Support

To whom it may concern,

My company is J. H. Fletcher & Company, (Fletcher®). Fletcher is located in Huntington, West Virginia. Fletcher is the world's leading supplier of underground mining roof bolters. We design and manufacture roof bolters and other specialized mining equipment that keeps miners safe. We have supplied equipment for mines all around the world.

Fletcher is located in the tri-state location of Northeast Kentucky, Southeast Ohio, and Western West Virginia. We are several hours from the nearest mechanical engineering schools.

We are in support of Marshall University to establish BSMF and MSME program. We feel our company can benefit greatly by partnering with Marshall to establish a strong and accredited engineering program in our community. Not only does Fletcher benefit but so does our tri-state community giving our children options of gaining a quality engineering education close to home.

Please let it be known J. H. Fletcher & Co fully supports Marshall University as it establishes and advances its engineering program.

Sincerely,

Tim Burgess, PE
Vice President of Engineering
J. H. Fletcher & Co.

Cc Doug Hardman
Rod Duncan
Greg Hinshaw



Marathon Petroleum Company LP

11631 US 23
Catlettsburg, KY 41129
Telephone 606/921-3333
FAX 606/921-3290

September 22, 2014

Asad A. Salem, Ph.D
Professor and Chair
Weisberg Division of Engineering
College of Information Technology and Engineering
Marshall University
Huntington, WV 25755-2586

Re: Marathon's Support of Marshall University developing a Mechanical Engineering Program

Dear Dr. Salem:

On behalf of Marathon Petroleum Corporation, I would like to express support for the development and accreditation of a Mechanical Engineering program at Marshall University. Marathon maintains a strong presence in the tri-state area in the form of our Catlettsburg (KY) Refinery, and other local facilities. 81 Marshall graduates are currently employed at the Catlettsburg site, but only two of those are recent engineering graduates. Having a vibrant Mechanical Engineering presence locally would provide an excellent source of engineers for Marathon and a source of jobs for Marshall graduates. Marathon employs a large number of engineers throughout our seven-refinery system and support groups. The Catlettsburg Refinery currently employs 113 degreed chemical, mechanical, electrical, and civil engineers. We utilize Mechanical Engineers in a variety of roles including project engineering, project management, maintenance support, and equipment reliability in addition to supervisory positions. We also utilize a robust co-op student program that involves the employment of engineering students to fill over 80 year-round positions. Marathon would welcome a quality, local source of engineers to fill these full-time and co-op positions.

Currently we recruit at a number of universities within reasonable proximity to our refineries including several that surround Marshall University (Virginia Tech, West Virginia Tech, The Ohio State University, University of Toledo, University of Cincinnati, University of Louisville, and The University of Kentucky). Marshall University would make a nice fit into our recruiting network and Marathon would provide an attractive source of employment opportunities for Marshall University ME graduates.

In summary, Marathon wholeheartedly supports the continued development of Marshall's Engineering Department in general and the Mechanical Engineering Department in particular. A recent forecast by Kelly Services quoted in Civil Engineering magazine (September 2014) predicts an increase of almost 250,000 engineering jobs in the US economy in the next ten years of which over 25,000 of those will be mechanical engineers. With the continued growth in the oil and gas sector including the Utica and Marcellus shale areas in West Virginia, Ohio, Pennsylvania, and New York, many of those jobs will be very reachable for Marshall graduates. Now is an excellent time to begin meeting the needs of the engineering market.

Sincerely,

Dan Schlaeppli
Engineering Manager
Catlettsburg Refining, LLC

CC: J. Lane
R. Hernandez
G. Jackson
M. Churton



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October 22, 2014

Asad A. Salem, Ph.D
Chair of the Weisberg Division of Engineering
College of Information Technology and Engineering
Marshall University
Huntington, WV 25755-2586

Dear Dr. Salem:

I have reviewed and studied the Intent to Plan for both the Bachelor of Science -Mechanical Engineering and the Master of Science in Mechanical Engineering Programs proposed for Marshall University.

As an employer of mechanical engineers, I have first-hand knowledge of the difficulty in recruiting mechanical engineers. The available pool is scarce and that difficulty will increase significantly when the "baby boomer" generation begins to retire. I recently read that it is estimated that over 33% of the engineers employed in architectural/engineering firms in the United States are over 55 years old.

Marshall University is situated in a region that is heavily industrialized as well as a major energy producing area. The demand for mechanical engineers in these markets far exceeds the availability, resulting in increased costs to employers in the recruitment and retaining graduate mechanical engineers to meet this ever-growing demand.

The need for these two programs outlined in the Intent to Plan is compelling and irrefutable. I strongly support the development of these two programs at Marshall University.

Very truly yours,

- 

Ron D. Gilkerson, PE
President

RDG/rf



► TRIAD Listens, Designs & Delivers

Asad A. Saleem, Ph.D
Professor and Chair
Weisberg Division of Engineering
College of Information Technology and Engineering
One John Marshall Drive
Huntington, WV 25755-2586

I wanted to take a moment and to tell you that I am pleased that Marshall University is expanding their engineering program to include a Bachelor and Masters of Science in Mechanical Engineering. As you are aware I have been associated with the engineering program at Marshall during my forty year career at the U.S. Corps of Engineers in Huntington, West Virginia and now during my career at Triad Engineering, Inc. Although my professional work is more directly related to the civil engineering profession, I often work on projects that require the services of a mechanical engineer. From my experience at the Corps and working with other firms that provide mechanical engineering services, the addition of the Mechanical Engineering program at Marshall University will help to fulfill a shortage of mechanical engineers in this area.

Carl F. Meadows

p: 304.755.0721 **f:** 304.755.1880 **w:** www.triadeng.com

From: David.S.Webb@dupont.com [mailto:David.S.Webb@dupont.com]

Sent: Wednesday, January 21, 2015 3:58 PM

To: Salem, Asad

Subject: David Webb - DuPont

Dr. Assad Salem,

Thank you very much for your time and explaining the status of the engineering program at Marshall University. I believe that a Mechanical and Engineering school at Marshall is an absolute necessity for the region. This will help drive businesses to expand and develop faster with a larger pool of skilled engineers to choose from in the Tri-State Area. Recruiting of engineers from outside the state that did not grow up here is very difficult. A local engineering University in the Huntington vicinity solves the problem long-term for companies and corporation. It allows us grow more easily with stable work force that want to live in this are...

I believe this will also drive entrepreneurship in starting and building high-tech new businesses not only in Hunting but the Tri-State area in general. In addition, it will also help attract large corporations to locate in the area and/or expand more easily.

The FACT the Marshall University already has a Civil engineering program that is ABET certified and is on its way to this certification in Mechanical Engineering. I would like to announce my support for the coop program for Mechanical Engineering program at Marshall University. I would like to begin recruitment of the first coops in the program in February 2015 for the Summer and Fall Semesters of 2015.

Please advise to a target date in February for me to come an interview student candidates.

I look forward to meeting your new potential engineers.

Regards,

David Webb
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APPENDIX B
Attached Spread Sheet
FIVE-YEAR COST and FUNDING

ANNUAL OPERATING EXPENSES																
Office Supplies																
Faculty Recruitment																
Adjunct & Part-Time/Faculty Positions																
Equipment Maintenance																
Equipment Replacement Fund (Maximum in Year 1)																
Library Resources																
Contingency																
Employee-based expenses																
Number of Employees																
Direct Cost (Phone/Internet, Internet, Software/Computer Replacement)	\$	900														
Section Notes: Itemized lines are examples. Update lines and annual amounts as necessary. Employee count is automatic for any employee line with a salary.																
ANNUAL OPERATING EXPENSES TOTAL	\$	55,000	\$	88,000	\$	151,000	\$	151,000	\$	151,000	\$	144,500				
PROJECTED OPERATING EXPENSES TOTAL	\$	105,000	\$	111,000	\$	224,500	\$	224,500	\$	221,502	\$	302,420				
TOTAL EXPENDITURE ESTIMATES																
	\$	250,000	\$	292,200	\$	405,500	\$	394,004	\$	478,002	\$	594,000				
REVENUE ESTIMATES																
Total students - Resident	-	-	9	9	20	20	20	20	20	20	20	36				
Total students - Nonresident	-	-	-	-	-	-	-	-	-	-	-	36				
Total BBA Fees Resident	\$	-	\$	40,811	\$	116,226	\$	116,226	\$	116,226	\$	242,382				
Total BBA Fees Nonresident	\$	-	\$	323,592	\$	289,375	\$	394,773	\$	446,341	\$	602,581				
Total Program/College Fees Resident	\$	-	\$	7,200	\$	36,000	\$	36,000	\$	36,000	\$	28,800				
Total Program/College Fees Nonresident	\$	-	\$	7,200	\$	36,000	\$	36,000	\$	36,000	\$	28,800				
Section Notes: Amounts above are all driven by formulae. Adjust fee and students counts below to set expected/goal amounts																
TOTAL REVENUE ESTIMATES				\$	381,349		\$	487,600		\$	584,571		\$	629,567		
ANNUAL NET INCOME																
					\$	280,600		\$	301,500		\$	304,570		\$	309,067	
CURRENT YEAR INCOME																
						\$	280,600		\$	302,500		\$	302,500		\$	302,500

					YER01	YER02	YEARS	YER04	YEARS
ProgramRes-Res					800	800	800	800	800
ProgramSec-Nbres					800	800	800	800	800
ReschroRes(ESG)						500%	500%	500%	500%
ReschroNbres(ESG)						500%	500%	500%	500%
ESGRes				1st year	\$ 5535 \$	5801 \$	6102 \$	6407 \$	6727
ESG Nbres				1st year	\$ 13770 \$	14459 \$	15182 \$	15941 \$	16788
TotalRes:Subrbs				1st year	9	20	26	28	36
TotalNbres:Subrbs				1st year	9	20	26	28	36
TotalRes:Subrbs				2nd year		7	15	20	21
TotalNbres:Subrbs				2nd year		6	13	17	18
TotalRes:Subrbs				3rd year		-	5	12	16
TotalNbres:Subrbs				3rd year		-	5	10	14
TotalRes:Subrbs				4th year		-	-	5	11
TotalNbres:Subrbs				4th year		-	-	4	9
Reserfion-ResidntW1toW2						73%	73%	73%	73%
Reserfion-NbresidntW1toW2						68%	68%	68%	68%
Reserfion-ResidntW2toW3						80%	80%	80%	80%
Reserfion-NbresidntW2toW3						80%	80%	80%	80%
Reserfion-ResidntW3toW4						90%	90%	90%	90%
Reserfion-NbresidntW3toW4						90%	90%	90%	90%