OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION
STATE CAPITOL COMPLEX, OKLAHOMA CITY

ACADEMIC UNIT/ DEGREE PROGRAM REVIEW

FOR

SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING

COLLEGE OF ENGINEERING, ARCHITECTURE AND TECHNOLOGY
OKLAHOMA STATE UNIVERSITY
STILLWATER, OK 74078

March 1, 2005

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OKLAHOMA STATE UNIVERSITY
ACADEMIC PROGRAM REVIEW
EXECUTIVE SUMMARY

DEPARTMENT OR DEGREE PROGRAM: School of Mechanical and Aerospace Engineering

Address items specified in OSRHE policy on program review (VI-Content of Program Review Reports): description of review process, program objectives, student outcomes assessment, and program recommendations. Please limit the summary to 1 or 2 pages. The review process began with a review of the goals and objectives of the various MAE academic programs. It continued with an MAE faculty committee of 4 who benchmarked our programs against a national peer group, mainly the Big 12, and then presented a draft of their conclusions to the entire faculty, received input from them, and refined their conclusions. The Department Head together with 3 staff members undertook the bulk of preparing this report, but drew upon recently completed Strategic Plan studies and assessment studies, in which the entire departmental faculty has been involved.

The educational objectives of the B.S.A.E. and B.S.M.E. degree programs are: (1) to educate engineers who can identify, formulate and provide effective solutions to real-life, complex problems; (2) to prepare engineers for successful careers by providing them with an appropriate background in mathematics, humanities, the sciences and engineering, and to instill in them a recognition of the need for lifelong learning and of the need to remain current in their chosen disciplines; (3) to educate engineers who can realize successful designs through proper use of classical and modern engineering tools while incorporating engineering standards and realistic constraints; (4) to prepare engineers to contribute successfully within teams and to communicate their ideas and solutions effectively. The overall objective of the M.S.M.E. program is to prepare graduates for research, development, and advanced engineering positions in industry and government, as well as prepare students to study for the Ph.D. degree in M.E. The overall objective of the Ph.D. program is to prepare graduates for research and development positions in industry and government, or for research and teaching in engineering.

In our most recent 2004 assessment, performance of seniors on the national Fundamentals of Engineering Exam was a key component. For aerospace engineering and mechanical engineering majors, the trends are upward for all outcomes and equal or exceed our targets.
For our senior exit interviews, we track average student responses on a 5 point scale for each of 11 Program Outcomes for both B.S.A.E and B.S.M.E. majors. The results show that we have met or exceeded our targets in all areas. Our alumni and employer survey data shows similar results.

For the M.S.M.E. degree, each graduating student is required to submit either a written thesis or a written report and to hold an oral defense before a committee of at least 3 MAE faculty members. During the 2003-2004, academic year, assessment results indicated that we may have too many students taking the 2-credit-hour report option (with 33 hours of organized courses) for the M.S. degree, which is less demanding than the 6-credit hour thesis option (with 24 hours of organized courses). The quality of some of these reports appears to be marginal. Further assessment indicates that the total number of M.S. students who are not bound for the Ph.D. should be reduced.

For the Ph.D. degree, once a student has a faculty advisor, he/she must pass a preliminary examination, which consists of defining an appropriate research problem, laying out possible approaches to solve it, writing this work up in a prelim report, and defending it orally before his/her Ph.D. committee of at least 4 four faculty members. During the 2003-2004 academic year, 4 out of 5 passed and were allowed to continue. The second step in the process is to pass a qualifying exam, which consists of an extensive written report laying out a problem together with progress made on addressing this problem. The student must then also defend this work orally before his/her committee. During 2003-2004 all 4 sitting for the qualifying exam passed. The final step is to pass a final exam, consisting of a written dissertation and oral defense before the committee. During 2003-2004, all 4 sitting for this exam passed. In the assessment of these committees, no deficiencies or suggestions for improvement were found. Further assessment indicates that the proportion of Ph.D. to M.S. students should be increased, with a strategic target of at least 33% of our graduate students admitted to study for the Ph.D.

Strengths of the Programs: Highly qualified and motivated faculty and staff; generally well-taught courses; well-qualified students at the undergraduate and graduate levels, with strong work ethic; strong support from CEAT; experienced and effective management at the departmental level; excellent research facilities and equipment; enthusiastic support from employers and Industrial Advisory Board.

Areas for Improvement: Increase the number of tenure track faculty; increase faculty salaries to be at parity with Big 12 institutions; increase in allocated operational funds for the School; increase in quantity and amounts of full tuition waivers for graduate students, both domestic and international; reduced teaching loads for faculty; increased staff support for faculty; improved efficiencies in OSU-provided services, including accounting systems, information technology support, physical plant support ; and increase in extramural funding secured by faculty.

Recommendations for Action: Convince OSU administration to remedy the areas listed in areas for improvement above; assuming increases in salary are secured, use resources to reward faculty for increased research productivity, as well as increased teaching effectiveness; follow MAE Strategic Plan finalized Summer 2004 (www.mae.okstate.edu).

Dean Karl N. Reid (Signature   Date 3/4/05

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

Aerospace Engineering – BS
Title of unit or degree program reviewed (Level III)

With options (Level IV) in: --

Bachelor of Science
Degree designation as on diploma (Level II)

BS
Formal degree abbreviation (Level I)

Degree-granting academic unit: School of Mechanical and Aerospace Engineering (Name) — 507 (Cost Center)

CIP code: 140201

HEGIS code: 0902

Instructional Program code: 424

Name of department head (person who oversees degree program listed above): Lawrence L. Hoberock

Program holds specialized accreditation from: Accreditation Board for Engineering and Technology

Name and title of contact person: Lawrence L. Hoberock (Name)
Professor and Head (Title)

Date of Institutional Governing Board Review: ______________________

President ______________________ (Signature) Date: ______________________

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

Mechanical Engineering – BS
Title of unit or degree program reviewed (Level III)

With options (Level IV) in: Mechanical
Pre-medical

Bachelor of Science
Degree designation as on diploma (Level II)

BS
Formal degree abbreviation (Level I)

Degree-granting academic unit School of Mechanical and Aerospace Engineering (Name) 507 (Cost Center)

CIP code 141901

HEGIS code 0190

Instructional Program code 144

Name of department head Lawrence L. Hoberock
(person who oversees degree program listed above)

Program holds specialized accreditation from Accreditation Board for Engineering and Technology

Name and title of contact person Lawrence L. Hoberock
(Name)
Professor and Head
(Title)

Date of Institutional Governing Board Review: ____________

President ____________ Date: ____________
(Signature)

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

Mechanical Engineering – MS
Title of unit or degree program reviewed (Level III)

With options (Level IV) in: --

Master of Science
Degree designation as on diploma (Level II)

MS
Formal degree abbreviation (Level I)

Degree-granting academic unit: School of Mechanical and Aerospace Engineering (Name) 507 (Cost Center)

CIP code 141901

HEGIS code 0190

Instructional Program code 145

Name of department head (person who oversees degree program listed above): Lawrence L. Hoberock

Program holds specialized accreditation from n/a

Name and title of contact person: Lawrence L. Hoberock (Name)
Professor and Head (Title)

Date of Institutional Governing Board Review: ____________________

President ____________________ (Signature) Date: ____________________

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

Mechanical Engineering – PhD
Title of unit or degree program reviewed (Level III)

With options (Level IV) in: --

Doctor of Philosophy
Degree designation as on diploma (Level II)

PhD
Formal degree abbreviation (Level I)

Degree-granting academic unit: School of Mechanical and Aerospace Engineering (Name) 507 (Cost Center)

CIP code 141901

HEGIS code 0190

Instructional Program code 146

Name of department head Lawrence L. Hoberock
(person who oversees degree program listed above)

Program holds specialized accreditation from n/a

Name and title of contact person Lawrence L. Hoberock (Name)
Professor and Head (Title)

Date of Institutional Governing Board Review: ____________

President ____________ (Signature) Date: ____________

OVERVIEW

A. Description of the Departmental/Program Review Process *(Briefly describe how the review was conducted and who was involved)* The review process began with a review of the goals and objectives of the various MAE academic programs, as described in our "Mission Statement and Five Year Goals and Objectives 1999-2004, dated March 11, 1999. (Appendix F) It continued with an MAE faculty committee of 4 who benchmarked our programs against a national peer group, mainly the Big 12, and then presented a draft of their conclusions to the entire faculty, received input from them, and refined their conclusions. This produced not only a thorough program review, but also formed the basis for our new Strategic Plan, completed Summer 2005, in conjunction with the OSU System Strategic Planning Exercise. The Department Head together with 3 staff members undertook the bulk of preparing this report, but drew upon recently completed Strategic Plan studies and assessment studies, in which the entire departmental faculty has been involved. Key portions of this review included annual assessment reports, reports by our Industrial Advisory Board, our internally-prepared report preparing for our most recent accreditation visit in the Fall of 2003, and, following this visit, the externally-prepared accreditation report from the national Accreditation Board for Engineering and Technology (ABET).

B. Recommendations from Previous Program Reviews. *(Discuss actions taken to address the recommendations of program faculty from the last program review.)* Following faculty recommendations from our March 26, 1999, Program Review, we have implemented the following: (1) The BSME program requirement has been reduced from 131 to 124 credit hours and the BSAE program requirement has been reduced from 134 to 127 hours; (2) Following the implementation of recommendations of the CEAT Curriculum Committees on Engineering Science Courses, the core Engineering Science courses of Statics, Dynamics, and Strength of Materials have each been increased from 2 to 3 credit hours, thus strengthening a core portion of the BSME and BSAE curricula; (3) All MAE undergraduate laboratory space has been significantly upgraded. Most of this upgrade consisted of moving from the old Quonset hut building, called the North Lab at McElroy and Knoblock, into what is now called the CEAT Design and Manufacturing Lab (DML) at 1724 West Tyler and into the Advanced Technology Research Center (ATRC). The new labs are more spacious, better maintained, and better equipped. The course facilities that have thus been improved are: (a) to the DML - MAE 3033 Engineering Design, MAE 4344 Design Projects; MAE 4354 Aerospace Systems Design for Mechanical Engineers; and MAE 4374 Aerospace Systems Design; and (b) to the ATRC – MAE 4273 Experimental Fluid Mechanics and MAE 4223 Aerospace Engineering Laboratory.

CRITERION I
Program Centrality

A. Goals & Objectives of Degree Programs. *(List each degree option, its clientele, objectives, and expected student outcomes. For program clientele, briefly describe the students in the program, e.g., are they primarily full-time traditional college-age students in Stillwater or part-time nontraditional students in Tulsa? Expected student outcomes for the degree program are described in the program's Student Outcomes Assessment Plan)*

Degree Program: B.S.M.E. and B.S.A.E.
Program Clientele: For the B.S.M.E. program, offered both in Stillwater and Tulsa, the Stillwater students are primarily full-time traditional college-age students. In Tulsa, the students are primarily part time students, but most are of traditional college student age. For the B.S.A.E. program, offered only in Stillwater, the students are primarily full-time traditional college-age students.

Program Objectives: The educational objectives of the B.S.A.E. and B.S.M.E. degree programs are: (1) to educate engineers who can identify, formulate and provide effective solutions to real-life, complex problems; (2) to prepare engineers for successful careers by providing them with an appropriate background in mathematics, humanities, the sciences and engineering, and to instill in them a recognition of the need for lifelong learning and of the need to remain current in their chosen disciplines; (3) to educate engineers who can realize successful designs through proper use of classical and modern engineering tools while incorporating engineering standards and realistic constraints; (4) to prepare engineers to contribute successfully within teams and to communicate their ideas and solutions effectively.

Expected Student Outcomes: For both the B.S.A.E. and B.S.M.E. programs the expected student outcomes are:
POa - an ability to apply knowledge of mathematics, science, and engineering to the mechanical and aerospace engineering disciplines
POb - an ability to design and conduct experiments, analyze and interpret data
POc - an ability to design a system, component or process to meet desired needs
POd - an ability to function on teams, some of which require consideration of multiple disciplines
POe - an ability to identify, formulate and solve engineering problems
POf - an understanding of professional and ethical responsibility
POg - an ability to communicate effectively
POh - an ability to understand the impact of engineering solutions in a societal context ("societal" includes "global")
POi - a recognition of the need for, and an ability to engage in, life-long learning
POj - a knowledge of contemporary issues
POk - an ability to use the techniques, skills and modern engineering tools necessary for engineering practice

In addition to these outcomes, we have established 4 additional outcomes specific to the B.S.M.E. program. These are:
MEP01 – A knowledge of chemistry and calculus-based physics with depth in at least one of the two.
MEP02 – The ability to apply advanced mathematics through multivariate calculus and differential equations.
MEP03 – A familiarity with statistics and linear algebra
MEP04 – The ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems.

Finally, for the B.S.A.E. program, we have specified additional outcomes to this program, as follows:
AEP01 – Knowledge of the following aeronautical topics: aerodynamics, aerospace

materials, structures, propulsion, flight mechanics, and stability and control
AEP02 – Knowledge of some of the following astronautical topics: orbital mechanics, space environment, attitude determination and control, telecommunications
AEP03 – Graduates must have design competence which includes integration of aeronautical or astronautical topics

Degree Program: M.S.M.E.

Program Clientele: Primarily full-time traditional college age students, the majority of whom are international students. More than 98% are Stillwater students. Less than 5% are part-time non-traditional college age students, who complete organized coursework via TWCV. All of the graduate MAE courses originate in Stillwater.

Program Objectives: The overall objective of the M.S.M.E. program is to prepare graduates for research, development, and advanced engineering positions in industry and government, as well as prepare students to study for the Ph.D. degree in M.E. To do this, the program produces graduates who have completed an individually-tailored plan of graduate course work, focusing in at least one area of mechanical engineering, and who can undertake a significant independent investigation and successfully defend the results of that investigation before specialists in their area.

Expected Student Outcomes: An ability to solve significant engineering problems using advanced technology in their area of specialty; an ability to successfully complete and defend with competence an individual investigation at an advanced level of an assigned problem in their area of specialty; and to communicate the results of such investigation effectively, both orally and in writing.

Degree Program: Ph.D.

Program Clientele: Almost all are full-time traditional college age students, the majority of whom are international students. More than 98% are Stillwater students. All of the graduate MAE courses originate in Stillwater.

Program Objectives: The overall objective of the Ph.D. program is to prepare graduates for research and development positions in industry and government, or for research and teaching in engineering. To do this, the program produces graduates who have completed a substantial and individually-tailored plan of graduate course work, focusing in at least one area of mechanical engineering; who can identify a significant technical problem requiring the development of new knowledge; can develop a research plan to undertake the investigation to produce this new knowledge; can undertake and complete a significant independent investigation in such problem; and can successfully defend the results of that investigation before specialists in their area.

Expected Student Outcomes: An ability to identify and solve significant engineering problems, producing new knowledge sufficiently substantial for publication in peer-reviewed technical journals and technical conference proceedings, using advanced technology in their area of specialty; an ability to successfully complete and defend with competence an individual, advanced level investigation of a problem they have identified in their area of specialty; and to communicate the results of such investigation effectively, both orally and in writing, including the publishing of such results in peer-reviewed technical journals and successful oral presentation at major national and international conferences.

B. Linkage of the Program to Institution's Mission *(Use the mission "Proud of its land grant heritage, Oklahoma State University advances knowledge, enriches lives, and stimulates / enhances economic development through instruction, research, outreach, and creative activities" or the final version of the OSU mission).* The program objectives and student outcomes listed above are tied by their very nature to the stated OSU mission, primarily in research and instruction. Students completing B.S., M.S. and Ph.D. degrees will, from the program outcomes, enrich the lives of others, as well as enriching their own lives by being able to achieve a higher standard of living and to undertake more challenging technical problems. It is not disputable that economic development has always been a direct benefit of competent engineering work at all levels. Details are contained in our Strategic Plan (www.mae.okstate.edu).

CRITERION II
Program Curriculum and Structure

A. Program Structure *(Attach copies of the current degree requirements sheet)*

OKLAHOMA STATE UNIVERSITY

GENERAL REQUIREMENTS — COLLEGE OF ENGINEERING, ARCHITECTURE AND TECHNOLOGY

For students matriculating:

Academic Year .... 2003-04 — BACHELOR OF SCIENCE IN AEROSPACE ENGINEERING (DEGREE)

Total hours .... 127 — AEROSPACE ENGINEERING (MAJOR)

Minimum overall grade-point average 2.00

Other GPA requirements, see below.

General Education Requirements 38 Hours

Area	Hrs	To Be Selected From
Underlined courses below are Pre-Engineering requirements used simultaneously to meet general education requirements.		
English Composition and Oral Communication	6	ENGL 1113 or 1313, 1213 or 1413, 3323. Total hours for degree is based on substitution of 3323 for 1213 as per Academic Regulation 3.5.
American History and Government	6	HIST 1103 POLS 1113
Analytical and Quantitative Thought (A)	13	MATH 2144, 2153, 2163, 2233
Humanities (H)	3	Any course designated (H). See Departmental note below.
Natural Sciences (N)	4	CHEM 1414 or 1515
Social and Behavioral Sciences (S)	6	Any courses designated (S). See Departmental note below.
International Dimension (I)	-	Any course designated (I). Students are encouraged to meet the requirement in their selection of (H) or (S) course work.
Scientific Investigation (L)	-	Any course designated (L). Normally met by Natural Science and/or Basic Science requirements.

College/Departmental Requirements Pre-Engineering 28 Hours

Area	Hrs	To Be Selected From
Basic Science	8	PHYS 2014, 2114
Engineering	5	ENGR 1111, 1332, 1412
Engineering Science	15	ENSC 2113, 2123, 2143, 2213, 2613
Humanities and Social Sciences		The Total (H) & (S) program must satisfy ABET accreditation criteria. Consult an advisor and the departmental policy.

Major Requirements 61 Hours

Common Professional School 15 Hours

Area	Hrs	To Be Selected From
Mathematics	3	STAT 4073
Engineering Science	6	ENSC 3233, 3313
Basic Science	3	From: ASTR 1014, 1024; BIOL 1114, CHEM 3053, GEOL 1114, PHYS 3213, 3313
Humanities (To complete Gen. Ed. requirements)	3	Courses designated (H). See Departmental requirement statement.

Specific Professional School Requirements 46 Hours

Admitted to the Professional School of Mechanical and Aerospace Engineering. (See Professional School Admission Requirements in catalog.)

1. A total of 40 credit hours as follows:

   MAE 3033, 3113, 3253, 3293, 3323, 3403, 3723, 4223, 4243, 4283, 4374, 4513

   IEM 3503

2. 6 hours must be selected from:

   MAE 3123, 3223, 3233, 4053, 4063, 4273, 4333, 4363, 4733

   With at least 3 hours selected from the 4000 level courses.

Other Requirements: A 2.00 GPA is required in all course work listed in the right hand column above.
A "C" or better is required in each course that is a prerequisite for a major course.
A minimum overall 2.00 GPA is required in 4000-level MAE prefix courses.
The major engineering design experience, capstone course, requirement is satisfied by MAE 4374.

Students will be held responsible for degree requirements in effect at the time of matriculation (date of first enrollment) and any changes that are made so long as these changes do not result in semester credit hours being added or do not delay graduation.

Karen N. Reid — DEAN

L J Hoberock — DEPARTMENT HEAD

EN-1

OKLAHOMA STATE UNIVERSITY

GENERAL REQUIREMENTS

For students matriculating:

Academic Year 2003-04

Total hours 124

Minimum overall grade-point average 2.00

Other GPA requirements, see below.

COLLEGE OF ENGINEERING, ARCHITECTURE AND TECHNOLOGY

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

DEGREE

MECHANICAL ENGINEERING

MAJOR

General Education Requirements 38 Hours		
Area	Hrs	To Be Selected From
Underlined courses below are Pre-Engineeing requirements used Simultaneously to meet general Education requirements.		
English Composition and Oral Communication	6	ENGL 1113 or 1313, 1213 or 1413, 3323. Total hours for degree is based on substitution of 3323 for 1213 as per AcademicRegulation 3.5
American History and Government	6	HIST 1103 POLS 1113
Analytical and Quantitative Thought (A)	13	MATH 2144, 2153, 2163, 2233
Humanities (H)	3	Any course designated (H). See Departmental note below.
Natural Sciences (N)	4	CHEM 1414 or 1515
Social and Behavioral Sciences (S)	6	Any courses designated (S). See Departmental note below.
International Dimension (I)	-	Any course designated (I). Students are encouraged to meet the requirement in their selection of (H) or (S) course work.
Scientific Investigation (L)	-	Any course designated (L). Normally met by Natural Science and/or Basic Science requirements.

College/Departmental Requirements Pre-Engineering 28 Hours		
Basic Science	8	PHYS 2014, 2114
Engineering	5	ENGR 1111, 1332, 1412
Engineering Science	15	ENSC 2113, 2123, 2143, 2213, 2613
Humanities and Social Sciences	-	The total (H) and (S) program must satisfy ABET Accreditation criteria. Consult an advisor and the Departmental policy.

Major Requirements 58 Hours		
Common Professional School 15 Hours		
Mathematics	3	STAT 4073
Engineering	6	ENSC 3233, 3313
Basic Science	3	From: ASTR 1014, 1024, BIOL 1114, CHEM 3053, GEOL 1114, PHYS 3213, 3313
Humanities (To complete Gen Ed. requirements)	3	Courses designated (H). See Departmental requirement statement.

Specific Professional School Requirements 43 Hours

Admitted to the Professional School of Mechanical and Aerospace Engineering. (See Professional School Admission Requirements in catalog.)

1. 24 hours as follows:
   MAE 3033, 3113, 3223, 3233, 3323, 3403, 3723, IEM 3503
2. A total of 13 credit hours from the following 4 categories, selecting one course from each category so that all 4 categories are represented.

   Category I (Thermal Systems Realization)
   MAE 4243, 4263, 4703, 4713

   Category II (Mechanical Systems Realization)
   MAE 4353,4513, 4733

   Category III (Laboratory)
   MAE 4273, 4333, 4363

   Category IV (Capstone Design)
   MAE 4344, 4354
3. A totoal of 6 hours to be selected from the following list, or from courses in the 4 Categories listed above, but not used to satisfy that category.
   MAE 3123, 3253, 3293, 4053, 4063, 4313

Other Requirements: A 2.00 GPA is required in all course work listed in the right hand column above.
A "C" or better is required in each course that is a prerequisite for a major course.
A minimum overall 2.00 GPA is required in 4000-level MAE prefix courses.
The major engineering design experience, capstone course, requirement is satisfied by MAE 4344 or MAE 4354.

Students will be held responsible for degree requirements in effect at the time of matriculation (date of first enrollment) and any changes that are made so long as these changes do not result in semester credit hours being added or do not delay graduation.

Karl N. Reid
DEAN

DEPARTMENT HEAD

EN-15

OKLAHOMA STATE UNIVERSITY

GENERAL REQUIREMENTS — COLLEGE OF ENGINEERING, ARCHITECTURE AND TECHNOLOGY

For students matriculating:

Academic Year 2003-04

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING
DEGREE

MECHANICAL ENGINEERING
MAJOR

(PREMEDICAL)
OPTION

Total hours 143

Minimum overall grade-point average 2.00

Other GPA requirements, see below.

General Education Requirements 39 Hours

Area	Hrs	To Be Selected From
Underlined courses below are Pre-Engineering requiremsnts used simultaneously to meet general education requirements.		
English Composition and Oral Communication	6	ENGL 1113 or 1313, 1213 or 1413, 3323. Total hours for degree is based on substitution of 3323 for 1213 as per Academic Regulation 3.5.
American History and Government	6	HIST 1103 POLS 1113
Analytical and Quantitative Thought (A)	13	MATH 2144, 2153, 2163, 2233
Humanities (H)	3	ENGL* designated (H). See Departmental note below.
Natural Sciences (N)	5	CHEM 1515
Social and Behavioral Sciences (S)	6	SOC 1113, and ANTH*, PSYC*, SOC*, designated (S). See Departmental note below.
International Dimension (I)	-	Any course designated (I). Students are encouraged to meet the requirement in their selection of (H) or (S) course work.
Scientific Investigation (L)	-	Any course designated (L). Normally met by Natural Science and/or Basic Science requirements.
* Asterisks denote medical school entrance requirements.		

College/Departmental Requirements
Pre-Engineering 28 Hours

Basic Science	8	PHYS 2014, 2114
Engineering	5	ENGR 1111, 1332, 1412
Engineering Science	15	ENSC 2113, 2123, 2143, 2213, 2613
Humanities and Social Sciences	-	The total (H) & (S) program must satisfy ABET Accreditation criteria. Consult an advisor and the Departmental policy.

Major Requirements 76 Hours

Common Professional School 15 Hours

Mathematics	3	STAT 4073
Engineering Science	6	ENSC 3233, 3313
Basic Science	3	CHEM 3053
Humanities (To complete Gen Ed. requirements)	3	3 hours designated (H) from ART*, ENGL*, FLL*, MUSI*, PHIL*, or TH*. Courses designated (H). See Departmental requirement statement.

Specific Professional School Requirements 61 Hours

Admitted to the Professional School of Mechanical and Aerospace Engineering. (See Professional School Admission Requirements.)

1. A total of 42 credit hours as follows:
   - MAE 3033, 3113, 3223, 3233, 3323, 3403, 3723
   - BIOL 1114, 1604
   - CHEM 3112, 3153
   - IEM 3503
   - ZOOL 3115
2. A total of 13 hours from the following 4 categories, selecting one course from each category so that all 4 categories are represented.

   Category I (Thermal Systems Realization)
   MAE 4243, 4263, 4703, 4713

   Category II (Mechanical Systems Realization)
   MAE 4353, 4513, 4733

   Category III (Laboratory)
   MAE 4273, 4333, 4363

   Catagory IV (Capstone Design)
   MAE 4344, 4354
3. A total of 6 hours to be selected from the following list, or from courses in the 4 categories above, but not use to satisfy that category.

   MAE 3123, 3253, 3293, 4053, 4063, 4313
4. The following are suggested but not required: BIOL 3014 or 3024; ZOOL 4134, 4253. CHEM 1314 is recommended with CHEM 1515 to meet the Oklahoma medical schools' requirement for 9 hours of inorganic chemistry.

Other Requirements: A 2.00 GPA is required in all course work listed in the right hand column above.
A "C" or better is required in each course that is a prerequisite for a major course.
A minimum overall 2.00 GPA is required in 4000-level MAE prefix courses.
The major engineering design experience, capstone course, requirement is satisfied by MAE 4344 or MAE 4354

Students will be held responsible for degree requirements in effect at the time of matriculation (date of first enrollment) and any changes that are made so long as these changes do not result in semester credit hours being added or do not delay graduation.

DEAN

DEPARTMENT HEAD

EN-16

Master's Degree - Requirements

The minimal University requirements for the M.S. degree are determined by the Graduate College and can be found in the *University Catalog* (http://prodosu.okstate.edu). We, in MAE, have additional requirements in several areas. You have two options for completion of your Master's degree:

Thesis

A total of 30 credit hours, which includes **24 hours of formal coursework** (regularly scheduled classes, not independent study) and **six hours of MAE 5000** (Thesis) are required for the Thesis Option.

Creative Component

A total of 35 credit hours, which includes **33 hours of formal coursework** (regularly scheduled classes, not independent study) and **two hours of MAE 5010** (Creative Component) are required for the Creative Component Option.

Plan of Study

Before you have completed 17 hours of coursework, you must file an original Plan of Study with the Graduate College. Download and complete a Plan of Study from the Graduate College website: www.gradcollege.okstate.edu. Your Plan of Study is to be completed with the assistance of your Advisor. You are to collect the signature of your Advisor, two other faculty members, and the Director of MAE Graduate studies.

General requirements and procedures are found in the "*Graduate Plan of Study – General Requirements*" section of this document. MAE Graduate courses are listed on the "*Graduate Course Offerings*" sheet.

Your 30 (Thesis) or 35 (Creative Component) hours of coursework must satisfy the following:

	Mathematics (see "*Graduate Plan of Study – General Requirements*")	**5000- and 6000-level MAE courses**	**Research Hours**	4000-level MAE courses (marked + on "Graduate Course Offerings" sheet)	**Misc.**
Thesis Option	6 hours	12 or more hours	MAE 5000 (6 hours)	6 hours or less of courses approved for Graduate credit	Additional courses approved to fulfill remaining hours of coursework
Creative Component Option	6 hours	18 or more hours	MAE 5010 (2 hours)	6 hours or less of courses approved for Graduate credit	Additional courses approved to fulfill remaining hours of coursework

You must complete no less than 21 credit hours of 5000- and 6000-level courses through Oklahoma State University, as presented on your Plan of Study. 5000- and 6000-level MAE courses must comprise at least 50% of the total required coursework credit hours, **exclusive of report or thesis hours** (ex: 50% of 24 hours for Thesis, and 50% of 33 hours for Creative Component).

When completed and signed, you should make two copies of your Plan of Study, for:

- The MAE Assistant to the Graduate Director (to be kept in your MAE student file).
- Your own records (Track revisions and file "Final Revised Copy" of your Study Plan.).

Doctoral Degree – Requirements

Advisory Committee

You must select an Advisory Committee. Your Committee must consist of the following:

1. Major professor, or Committee Chairman who is usually the Thesis Advisor. The Committee Chairman must be a full member of the Graduate Faculty.
2. A mathematics, engineering (outside MAE), or science professor.

3. A minimum of two additional faculty members from schools or departments related to your field of study. MAE faculty should comprise a majority of the Committee.

Preliminary Examination

Proposal

After appointment of your Committee, your Advisor should call a meeting. The purpose of this initial meeting is to acquaint you with the Committee and begin the preliminary examination procedure. You should present a tentative subject to be used for your research proposal. This topic may be related to your Master's Thesis or Report. It will not necessarily be your final dissertation topic. The intent of the MAE 6010 project and the Preliminary Examination is to demonstrate your ability to independently prepare a worthwhile research plan. Committee approval of the topic will allow you to promptly begin the proposal for submission and defense (to be completed by the end of the eleventh month in the Ph.D. Program).

Credit

You should enroll in one hour of MAE 6010. This implies approximately 60 person-hours of work.

Examination

The Preliminary Examination must be taken within eleven months of enrollment in the Ph.D. Program. The Examination will consist of one or more of the following options:

1. You are required to develop a proposal, which you will research and write essentially independently of your Advisor. The proposal is expected to be approximately 50 pages (of quality content) in length. The Committee may ask any questions about the proposal as well as any engineering fundamentals, mathematics, or scientific areas covered by previous coursework as deemed necessary to evaluate and verify your potential for continuing in the Ph.D. Program. This proposal will typically be in your interest area, but may or may not be related to your Ph.D. Thesis. This type of Preliminary Examination is designed to determine your abilities to: 1) identify a problem, 2) search the literature, 3) define a theoretical, experimental, and/or computational approach, and 4) plan a research program.
2. As an alternative, or in addition to option 1 (additional if the Committee deems that, after not passing option, you should be given another opportunity to pass the Preliminary Examination), the Interviewing Committee may select the topic on which you are to write the proposal. Then, during the summer or between academic semesters, the Committee will provide you the topic two or three weeks before the proposal is due. During that two or three weeks, you are to work intensively and exclusively on this proposal, understanding the topic, searching the literature, carefully formulating the problem, and writing a potential research plan and/or solution procedure. At the conclusion of the two or three weeks, you will deliver your written document to the Committee. Two days later, you will orally present the proposal to the Committee. The proposal is expected to be approximately thirty pages (of quality content) in length. Similar to option 1, the Committee may ask any relevant questions about the proposal and/or coursework as deemed necessary to evaluate and verify your potential for continuing in the Ph.D. Program.

3. A series of written exams, taken over a two or three day time period, may be required of any student whom the Committee discovers to have a weak background in any area of previous coursework in engineering fundamentals, mathematics, or science. The Committee may have identified this weakness in background from informal interviews, examination of your transcripts, or through the formal Preliminary Examination process or option 1 or 2 above. One month in advance of these written exams, the Committee shall specify the coverage of the exams, what is considered to be a passing grade on these exams, and the rules for taking the exams (ex: allowance for open books and/or crib sheets, and length of time given).
4. A series of oral exams, taken over a two or three day time period, may be required of any student whom the Committee discovers to have a weak background in any area of previous coursework in engineering fundamentals, mathematics, or science. The same comments made with regard to written exams (in option 3 above) are applicable for oral exams, with regard to identification of weakness(es), potential breadth of exams, notice to the student, and Committee participation.

If the Committee gives you a second chance to pass the Preliminary Examination, by allowing you to take any one of options 1, 2, 3, or 4, and the Committee's assessment is that, as a result of that second chance, you do not receive an A or a B on the Preliminary Examination, there will be no third opportunity to take the Preliminary Examination. You will automatically be removed from the Ph.D. Program in the School of MAE.

Objectives of the Examination

1. Redirect candidates with poor prospects of success in the Ph.D. Program before the students have made large investments of time and resources.
2. Provide a focal point for the student's Committee to evaluate his/her potential and consider his/her Plan of Study.
3. Demonstrate the student's familiarity with literature, ability to organize a research proposal, competence in oral and written communication, and his/her understanding of engineering fundamentals, mathematics, and areas of science related to his/her chosen field of specialization.

Grade

A or B	Encouraged to continue Ph.D. Program
I	Conditional continuation in Ph.D. Program, with a reevaluation during the following semester under options 1 or 2, or with a reevaluation within a month under options 3 and/or 4
C, D, or F	Termination of Ph.D. Program

Preliminary Exam Report

The Committee will complete the "Preliminary Examination" results form.

Length of Exam

The oral exams of options 1 and 2 can last up to four hours in duration. The battery of written and oral exams of options 3 and 4 can be up to 12 hours each in duration.

Overall Time Limit

The maximum time that a student can take to complete the Preliminary Examination is 16 months after enrollment in the Ph.D. Program. If the student has not passed the Examination within that time, the student will automatically be removed from the MAE Ph.D. Program.

Plan of Study

- Your proposed plan should be organized with the assistance of the MAE Graduate Director and your Major Advisor prior to the Preliminary Examination. The proposed plan should be developed prior to enrollment in the second semester beyond the M.S. degree.
- Download a Plan of Study from the Graduate College website (www.gradcollege.okstate.edu) and include the requirements listed within this section and the "*Graduate Plan of Study – General Requirements*" section of this manual. MAE Graduate courses are listed on the "*Graduate Course Offerings*" sheet.
- Upon successful completion of the Preliminary Examination, you must file an approved Plan of Study with the Graduate College. Your plan must be submitted to the Graduate College before you have completed 28 hours of coursework. A copy should be filed with the MAE Assistant to the Graduate Director.
- Changes to your Plan of Study may be made with the approval of your Ph.D. Committee when your interests or course offerings require such changes. Substitutions will not be allowed for any course in which you earned a grade of "C" or lower unless the course is no longer scheduled on a regular basis.

  Your Ph.D. Plan of Study must contain:

  1. At least 60 hours of acceptable Graduate work beyond the M.S. Degree, not more than 30 hours of which can be research.
  2. At least 30 hours of 5000- and 6000-level coursework beyond the M.S. Degree.
  3. MAE 5000- and 6000-level courses for at least 50% of Graduate coursework taken at OSU.
  4. A minimum of 6 hours of mathematics beyond the requirements for the OSU M.S. Degree.

Your hours of Doctoral coursework must include the following:

Mathematics (see "*Graduate Plan of Study – General Requirements*")	**5000- and 6000-level MAE courses**	**Research Hours**	**Misc.**
6 hours	24 or more hours (at least 50% of Graduate coursework)	MAE 6000 (24-30 hours)	Additional courses approved to fulfill remaining hours of coursework

Qualifying Exam

Written Examinations: Optional [exercised by your Committee]; required when any member of your Advisory Committee or the MAE Graduate Committee deems necessary to:

- Remove all doubt as to significant weaknesses in a student's academic qualifications.
- Evaluate a student's qualification in an area with respect to other candidates.

Oral Exam: Required; includes a defense of the proposed Thesis subject, scope, and strategy; establishes the student's qualification to undertake his/her proposed research.

Typewritten Prospectus: Required; a typewritten prospectus must be submitted to each member of your Committee. The prospectus must contain:

1. Definition of Thesis problem
2. Background and literature survey,
3. Strategy for completion of Degree,
4. Outline of proposed study.

This prospectus should have greater depth and detail than the MAE 6010 proposal presented at the Preliminary Exam, and may contain partial analysis or some experiments and computations to prove the feasibility of the methods chosen. ***However, the Qualifying Exam must not be delayed until work is completed – it must be taken not less than six months before Dissertation Defense.***

Report of Qualifying Examination: Required; the *Admission to Doctoral Candidacy* form is to be returned to the Graduate College after the Qualifying exam is completed.

B. Distance Education *(List the courses offered by electronic or other distance delivery methods)*

Master's Degree – Distance Learning

DISTANCE LEARNING GRADUATE PROGRAM IN MECHANICAL ENGINEERING

The School of Mechanical and Aerospace Engineering (MAE), Oklahoma State University, proposes advanced-level engineering courses to be made available primarily through distance learning, leading to the degree of Master of Science in Mechanical Engineering. The School is committed to offering a sufficient number of courses of an appropriate mix such that students could complete the requirements for this degree in a timely manner. In order to finish his/her M.S.M.E. degree, a distance learning candidate must enroll in the Creative Component option of the Master's program. This option requires 33 credit hours of coursework (18 hours must be MAE 5000 or 6000) plus a 2 credit hour written report (MAE 5010) on a project approved by the student's advisor and committee, demonstrating creative abilities of the student, and an oral defense. A candidate must be admitted to graduate school in MAE and have selected, by mutual agreement, an MAE faculty member as his/her advisor, and a faculty advisory committee. The M.S.M.E. candidate must gain committee approval of his/her Plan of Study, and file an acceptable Plan of Study with the OSU Graduate College by completion of his/her 17th hour of graduate study. A minimum of 6 credit hours of mathematics beyond Differential Equations and Linear Algebra is required, and these may be met by completion of two of the following: MAE 5093 – Numerical Engineering Analysis, MAE 5463 – Nonlinear Systems Analysis and Control, and MAE 5573 – Continuum Mechanics. Further requirements are detailed in the School's "Master of Science Graduate Student Manual". In order that the courses listed below be offered by distance learning, a minimum of 8 distance learning students must be enrolled before the start of classes. The courses listed will also be offered on the Stillwater campus, assuming adequate enrollment.

5-YEAR COURSE OFFERING PLAN

FALL 2004	SPRING 2005	SUMMER 2005
MAE 5843 – Conduction Heat Transfer	MAE 5543 – Modern Materials	MAE 5093 – Num. Eng. Anal.*
MAE 5463 -Nonlinear Sys. Anal & Cont.*	MAE 5010 – Creative Component	MAE 5010 – Creative Component
MAE 5010 – Creative Component		

FALL	SPRING	SUMMER
FALL 2005 MAE 5573 – Continuum Mechanics * MAE 5463 -Nonlinear Sys. Anal. & Cont.* MAE 5010 – Creative Component	SPRING 2006 MAE 5553 - Fatigue & Fracture MAE 5010 – Creative Component	SUMMER 2006 MAE 5010 – Creative Component
FALL 2006 MAE 4053 – Auto. Control Sys. MAE 5463 -Nonlinear Sys. Anal. & Cont.* MAE 5010 – Creative Component	SPRING 2007 MAE 6263 – Computational Fluid Dyn. MAE 5010 – Creative Component	SUMMER 2007 MAE 5093 – Num. Eng. Anal.* MAE 5010 – Creative Component
FALL 2007 MAE 5463 – Nonlinear Sys. Anal & Cont.* MAE 5010 – Creative Component	SPRING 2008 MAE 5563 – Finite Element Anal. MAE 5010 – Creative Component	SUMMER 2008 MAE 5010 – Creative Component
FALL 2008 **MAE 5233 - Viscous Fluid Dynamics** MAE 5463 – Nonlinear Sys. Anal & Cont.* MAE 5010 – Creative Component	SPRING 2009 **MAE 5503 - Mech. of Adv. Composites** MAE 5010 – Creative Component	SUMMER 2009 **MAE 5093 - Num. Eng. Anal.*** MAE 5010 – Creative Component

* Six hours of these courses may substitute for the required six hours of math courses (the use of MAE 5463 and MAE 5573 to satisfy the MATH requirement is only applicable to the distant learning students).

C. **Articulation Agreement** *(Identify the articulation (2+2) agreements the program has with community colleges)*

OSU ARTICULATION
ENGINEERING

Institutions	Statics	Dynamics	Strength of Materials	Thermodynamics	Electrical Science	Fluid Mechanics	Material Science
CASC							
CSC							
CU							
ECU							
EOSC							
LU							
MSC							
NEOAMC		ENGR 2123					
NOC	ENGR 2113	ENGR 2123					
NSU					EPHY 3513		
NWOSU							
OCCC	ENGR 2133**			ENGR 2333**	ENGR 2613	ENGR 2343*	
OPSU							
OSU	ENSC 2113	ENSC 2123	ENSC 2143	ENSC 2213	ENSC 2613	ENSC 3233	ENSC 3313
OSUTB-OKC	ENSC 2113	ENSC 2123	ENSC 2143**		ENSC 2613***		
OSUTB-OKM							
OU			ENGR 2153	ENGR 2213	ENGR 2613	ENGR 3223	
RCC							
RSU							
Rose	ENGR 2123						
SEOSU							
SSC							
SWOSU							
SWOSU-Sayre							
TCC	EGR 2103	EGR 2503	EGR 2143	EGR 2213	EGR 2613		
TU	ES 2013	ES 2023		ES 3053			ES 3013
UCO		ENGR 3063			ENGR 2303		
USAO							
WOSC							

D. Multidisciplinary programs *(Briefly describe how program faculty participate in multidisciplinary programs with other OSU departments or other institutions).* MAE program faculty participate in the multidisciplinary Master of Science in Control Systems Engineering with faculty from the Schools of Electrical and Computer Engineering and Chemical Engineering. Almost all of the students are non-traditional, part-time, distance adult learners. Participation comes from: (1) Serving on a multi-disciplinary faculty oversight committee that approves courses for the program; (2) Offering selected MAE graduate level courses via TWCV at agreed-upon intervals to students enrolled in the program; and (3) Serving as research or creative component faculty advisors for students enrolled in the program.

CRITERION III
Program Resources

A. **New facilities and major equipment** *(Describe major changes in facilities and major equipment added in the past 5 years)* Three new facilities have provided significant improvements for both teaching and research. Our programs began occupying space in The Advanced Technology Research Center in the Fall of 1999. This is a 160,000 sq. ft. state-of-the art facility, primarily for engineering research, but also for selected instruction at both the graduate and undergraduate levels. MAE faculty occupy approximately 50% of the space that has been made available in this building. More than $10 million worth of state of the art research equipment has been acquired since then and moved into MAE labs in this facility, ranging from Atomic Force Microscopes, X-Ray Diffraction Machines, and nanoindenters through composite extrusion and pultrusion machines to High Speed Web lines. In addition to this facility, MAE is the lead organization in a new 25,000 sq. ft. CEAT Design and Manufacturing Laboratory (DML), refurbished in 2002 and equipped for undergraduate teaching requiring labs and shops in the design and manufacturing area. Included in this facility is a modern machine shop for student use, a composites fabrication facility, classroom, seminar room, well-equipped computer room, design rooms, project labs, and an aircraft assembly area. Finally, a separate MAE Research Lab of approximately 10,000 sq. ft. has been refurbished in the Electronics Research Building and is being used for fluid mechanics and HVAC research. Excellent space for assembly of large test fixtures has been created, and high-resolution equipment has been acquired and installed for investigation of micro fluid flow and heat transfer phenomena.

B. **Academic and administrative efficiencies** *(In the past 5 years, what strategies has the program used to achieve greater academic and administrative efficiencies?).* In 2002, the School of MAE, the School of IEM, and the Division of Engineering Technology joined forces to create the CEAT Design and Manufacturing Lab, allowing shared use of equipment and space for the teaching of undergraduate courses in design and manufacturing. This facility at 1724 West Tyler is managed by the School of MAE on behalf of CEAT. We have upgraded the lab manager position from classified to A & P, requiring an engineering degree as part of the qualifications. This has improved the level of help available to students working in the facility. The efficiencies of 3 units, as opposed to formerly one unit (ie, MAE), using shared space, equipment, and personnel are evident. We have also leveraged our permanent staff, without increasing the numbers as our faculty size has grown, by hiring more student help and assigning them to staff where the needs are greatest. Finally, we have relieved faculty who were spending excessive time on computer and web issues by hiring a half-time graduate student to handle our web site and by moving our departmental server to the College level.

C. **External funding.** If applicable, complete Appendix A External Grants, Contracts, and Gifts Awarded to Program Faculty for the past 5 years. *(Describe the changes in external funding during the past 5 years.)* As shown in Appendix A, the School has maintained strong external grants and contract funding, in spite of a significant downturn in the economy during the review period. The economic downturn played a large role in the decline in funding from $3.2MM in FY 2000 to $1.9MM in FY 2000. However, we also hit a period when several of our top faculty producers had large amounts of funding and did not need to write additional proposals. The build-back from $1.9MM in FY 2000 to $3.0MM in FY

2004 has been slow, but positive, with the continuing poor performance in the general economy holding back a stronger recovery. We expect this situation to change in FY 2005, with a stronger economy and more faculty writing proposals for larger amounts of funding. With 19 tenure track faculty in FY 2004, our average funding per proposal was $158K per tenure track faculty member, a very respectable average.

CRITERION IV
Productivity

A. Number of majors (headcount), student credit hours, and average time to graduation. Attach a copy of the 5 Year Academic Ledger for the department. *(Briefly summarize changes in the number of majors, student credit hours generated, and average time to graduation during the past 5 years.)* Some of the data provided in the attached 5-Yr Academic Ledger, provided by OSU Institutional Research Office is incorrect. Corrected data is provided below:

Headcount

	2000	2001	2002	2003	2004
Undergraduate	534	607	702	710	699
Graduate	135	133	111	184	179
Total	669	740	813	894	878

Retention/Graduation Rates – No. of Full-time Semesters

	2000	2001	2002	2003	2004
Undergraduate	9.3	9.5	9	9.2	9

Undergraduate majors are split approximately 33% B.S.A.E. and 67% B.S.M.E. majors. As can be seen, the number of majors at both the undergraduate and graduate levels have increased significantly during the past 5 years, with a 31.2% increase in the totals. This is clearly excessive for a faculty that has remained approximately the same in size over this period. Three years ago, we put into place enrollment management procedures to reduce the number of undergraduates admitted to professional school (juniors and seniors) at 90 per year, and starting in the Fall 05 semester, we will reduce this to 75 per year. At the graduate level, we also have excessive numbers of students, which we plan to reduce by focusing on fewer, higher-quality students, with fewer M.S. candidates and larger numbers of Ph.D. students. This is consistent with our new Strategic Plan (www.mae.okstate.edu).

From the attached Academic Ledger, the number of undergraduate student credit hours has increased by 22.6% over the five-year period, while the number of graduate student credit hours has decreased by 13.5%. Over all, there has been a 14.6% increase. In our review, we have decided that in keeping with the OSU, CEAT, and MAE Strategic Plans, we must reduce the number of undergraduate student credit hours and increase the number of graduate student credit hours, mainly at the doctoral level.

The average time to completion for either a B.S.M.E. or B.S.A.E. degree has remained approximately the same over the period at slightly more than 9 semesters. This is in keeping with national and peer group averages for these majors.

Oklahoma State University
FIVE-YEAR ACADEMIC REPORT CARD
MECH & AEROSP ENGR

Fall Semester	2000	2001	2002	2003	2004	Change Amount	Change Percent
Student Information							
Headcount							
Undergraduate	534	607	702	710	699	165	30.9%
Graduate	129	111	174	177	148	19	14.7%
Professional	0	0	0	0	0	0	-
Total	663	718	876	887	847	184	27.8%
Minority	236	215	275	265	236	0	0.0%
Non-minority	427	503	601	622	611	184	43.1%
Entry Information							
ACT Average	27.25	27.04	27.15	27.31	27.21	-0.04	-0.1%
ACT 25th - 75th Percentile	25-31	24-29	24-30	25-30	24-30		
Top 10% High Sch. Class(%)	37.5%	30.2%	40.6%	34.9%	23.5%	-14.0%	
Retention/Graduation Rates							
No. of Full-time Semesters	0	9.5	9	9.2	9	-0.5	-5.3%
Semester Credit Hours - State Funded							
Undergraduate	2,861	3,161	3,260	3,478	3,509	648	22.6%
Graduate	812	622	1,103	1,058	702	-110	-13.5%
Professional	0	0	0	0	0	0	-
Total	3,673	3,783	4,363	4,536	4,211	538	14.6%
Class Size							
% of Classes < 20	55.0%	45.0%	40.0%	46.5%	42.2%	-12.8%	
% of Classes > 50	7.5%	12.5%	12.5%	2.3%	6.7%	-0.8%	
OSU-Tulsa							
Headcount	18	31	74	92	90	72	400.0%
Student Credit Hours	108	269	291	633	630	522	483.3%
Faculty Information							
Instructional-FTE							
Professor-Lecturer	13.41	15.11	14.88	15.69	15.71	2.30	17.2%
Graduate Assistant	8.14	9.53	9.00	13.63	15.38	7.24	88.9%
Total	21.55	24.64	23.88	29.32	31.09	9.54	44.3%
Headcount							
Professor-Lecturer							
Total	22	24	27	25	27	5	22.7%
Minority	7	8	10	8	10	3	42.9%
Tenured/Tenure Track	16	18	18	19	19	3	18.8%
Tenured	13	15	15	15	16	3	23.1%
%Tenured	81.3%	83.3%	83.3%	78.9%	84.2%	3.0%	
% of Faculty Full - Time	98.1%	96.6%	98.4%	96.8%	96.8%	-1.3%	42.9%
Student Faculty Ratio	34.1	33.4	42.8	39.0	35.7	1.6	4.6%

Number of Lecture Classes Taught ,Avg Class Size	2000 Number	2000 Avg.	2001 Number	2001 Avg.	2002 Number	2002 Avg.	2003 Number	2003 Avg.	2004 Number	2004 Avg.	Change Amount	Change Percent
Undergraduate	24	37.8	24	41.0	24	42.3	27	34.5	28	44.9	4	16.7%
Graduate/Professional	16	12.0	16	10.0	16	16.0	16	14.0	17	11.0	1	6.3%
All Student	40	27.5	40	28.6	40	31.8	43	26.9	45	32.1	5	12.5%

Faculty Salaries vs. Peer Inst. (Full-time Faculty - 9 mos.)	2000 OSU	2000 Big 12	2001 OSU	2001 Big 12	2002 OSU	2002 Big 12	2003 OSU	2003 Big 12	2004 OSU	2004 Big 12	Change OSU Amount	Change OSU Percent
Professor	$86,645	$94,479	$89,957	$99,061	$89,957	$102,351	$91,431	$107,892	$95,013		$8,368	9.7%
Associate	$66,281	$69,717	$69,736	$72,525	$69,736	$73,900	$69,736	$76,191	$72,162		$5,881	8.9%
Assistant	$58,800	$61,719	$59,648	$64,331	$59,648	$66,058	$61,665	$68,484	$68,589		$9,789	16.6%

Classes Taught by Tenured/Tenure Track	2000	2001	2002	2003	2004	Change
% Lower Div. Classes	100%	100%	100%	100%	100%	0.00%
% Undergrad. Classes	79%	79%	79%	81%	79%	0.00%

Oklahoma State University
FIVE-YEAR ACADEMIC REPORT CARD
MECH & AEROSP ENGR

Fiscal Year	2000	2001	2002	2003	2004	Change Amount	Change Percent
Financial Information							
Faculty Salaries	$1,381,918	$1,368,838	$1,536,944	$1,325,884	$1,215,578	($166,340)	-12.0%
Other Salaries	$158,670	$180,171	$161,579	$293,933	$287,923	$129,253	81.5%
Fringe Benefits	$304,781	$364,238	$435,622	$408,852	$382,884	$78,103	25.6%
Travel	$3,367	$3,118	$3,055	$4,277	$2,267	($1,100)	-32.7%
Utilities	$0	$0	$0	$0	$0	$0	-
Supplies Other Oper. Exp.	$97,867	$118,701	$103,366	$96,123	$73,981	($23,886)	-24.4%
Property, Furniture Equip.	$11,136	$3,777	$16,406	$8,088	$5,463	($5,673)	-50.9%
Library Books Periodicals	$220	$41	$0	$0	$0	($220)	-100.0%
Transfers Other Disbur.	$0	$0	$0	$0	$0	$0	-
Total	$1,957,959	$2,038,883	$2,256,972	$2,137,157	$1,968,096	$10,137	0.5%
Cost per SCH	$253.23	$277.10	$270.36	$242.39	$210.38	($42.85)	-16.9%
Cost per SCH in Constant $	$253.23	$269.21	$258.30	$225.84	$189.98	($63.25)	-25.0%
Other Revenue							
Other Student Fees	$8,260	$8,405	$9,570	$8,450	$29,220	$20,960	253.8%
Gifts and Grants	$12,428	$108,516	$54,240	$14,917	$183,590	$171,162	1377.2%
OSU-Tulsa Fac. Exp. Transfers	$0	$123,900	$32,820	$279,598	$201,238	$201,238	-
Fees Related to Educ. Depts.	$0	($124)	$124	$26	$4,519	$4,519	-
Other Income	$128,840	$184,325	$531,193	$654,408	$791,284	$662,443	514.2%
Total	$149,528	$425,022	$627,947	$957,398	$1,209,851	$1,060,322	709.1%
External Funding							
Sponsored Expenditures**	$2,410,999	$2,278,327	$2,286,460	$2,462,680	$2,604,891	$193,892	8.0%

**Excludes federal appropriations for College of Agriculture Sciences and Natural Resources.

B. Faculty ratio and class size. **Attach a copy of the 5 Year Academic Ledger for the department.** ***(Briefly summarize changes in the student to faculty ratio and class size during the past 5 years. Provide a brief explanation of the future plans for the program related to student to faculty ratio and class size, the time frame required to accomplish these plans, and the budget implications of the plans.)*** The attached 5 Year Academic Ledger shows that the student to faculty ratio varied from a low of 34.1 to a high of 42.8 during the 5-year period, ending at 35.7. We believe this is excessive for a program that aspires to be in the top 75 in the U.S., and our plans are to reduce this by capping admission to MAE Professional School at 75 students per year (approx. 33% B.S.A.E. and 67% B.S.M.E. candidates), and by increasing faculty size. We seek to reduce this ratio to the low 20s within the next five years. During this period, the data show that we peaked at 5.3 B.S. graduates per tenure-track faculty member per year, when our national peer group average was 3.4, another indication of excessive numbers of students and excessive faculty teaching load. Moreover, our graduate student headcount has also been excessive, averaging as high as 8 graduate students per tenure track faculty member. During the next five years, we plan to reduce this to approximately 5 per faculty member, with a target of at least 1/3 of these being doctoral students. Reductions in both professional school and graduate admissions will, of course, reduce tuition and fee receipts. Hiring of additional faculty will require increased state allocations.

The percentage of classes with less than 20 students for the past 4 years has remained relatively stable in the low 40% range. This is due primarily to the large number of graduate classes we teach, and will not likely change. The percentage of classes with more than 50 students has fluctuated somewhat, with a low of 2.3% and a high of 12.5%. Part of this is due to the large sections of Engineering Science Classes we teach, and due to financial reasons, will likely remain large. We plan to totally eliminate class sizes over 50 in the upper division MAE courses by capping enrollment to MAE professional school at 75 per year, teaching required upper division MAE courses twice per year, and limiting enrollment in elective MAE courses.

C. 5 year average number of degrees conferred and majors. **Refer to the OSRHE productivity spreadsheet. (*Compare the number of graduates and majors to the minimum productivity standards established by the Oklahoma State Regents for Higher Education)***

Degree	**Number of Degrees Conferred**		**Majors (Headcount) – Fall Semester**	
	OSRHE standard	5 yr average	OSRHE standard	5 yr average
Certificate	NA	NA	NA	NA
Baccalaureate	5	98.5	12.5	650.4
Masters	3	32	6.0	117
Doctoral	2	3.4	4.5	33

If the department has more than one degree program in a degree level (e.g., BS and BA), please list the number of degrees and headcount enrollment for each program separately.

If the five year average for any degree program does not meet State Regents' minimum productivity requirements for graduates and/or headcount enrollment provide a brief explanation of the future plans for the program that will enable it to meet the productivity requirements, the time frame required to accomplish these plans, and the budget implications for continuation of the program. In the table above, the number of B.S.A.E. degrees and majors is approximately 33% of the total (i.e. 33 and 217, respectively), while the number of B.S.M.E. degrees is approximately 67% of the total (i.e., 66 and 434, respectively. As can be seen from these results and the remaining values in this table, all our programs are well above the OSRHE standards. In fact, by comparison with our peer group universities, it can be argued that the number of B.S. degrees and majors is excessive and should be reduced, in favor of more doctoral degrees and majors, which is an element in our current Strategic Plan (www.mae.okstate.edu).

CRITERION V
Quality

A. Program faculty qualifications

Name	Faculty Status (Regular or Adjunct)	Faculty FTE in program	Degrees Earned		Related Work Experience (years)
			Highest	Highest in Teaching Area	
			Type	Type	
Arena Jr, Andrew S.	Regular	1.00	Ph.D.	Ph.D.	12
Chambers, Frank W.	Regular	1.00	Ph.D.	Ph.D.	29
Coker, Demirkan	Regular	1.00	Ph.D.	Ph.D.	16
Conner Jr., Joseph P.	Adjunct	.50	M.S.	M.S.	4
Delahoussaye, Ronald D.	Regular	1.00	Ph.D.	Ph.D.	20
Fisher, Daniel E.	Regular	1.00	Ph.D.	Ph.D.	16
Ghajar, Afshin J.	Regular	1.00	Ph.D.	Ph.D.	25
Good, J. Keith	Regular	1.00	Ph.D.	Ph.D.	21
Hanan, Jay C.	Regular	1.00	Ph.D.	Ph.D.	8
Hoberock, Lawrence L.	Regular	1.00	Ph.D	Ph.D	38
Komanduri, Ranga	Regular	1.00	Ph.D.	Ph.D.	32
Lilley, David G.	Regular	1.00	DSc.	DSc.	35
Lu, Hongbing	Regular	1.00	Ph.D.	Ph.D.	8
Lucca, Don A.	Regular	1.00	Ph.D.	Ph.D.	22
Misawa, Eduardo A.	Regular	1.00	Ph.D.	Ph.D.	16
Moretti, Peter M.	Regular	1.00	Ph.D.	Ph.D.	40
Pagilla, Prabhakar R	Regular	1.00	Ph.D.	Ph.D.	8
Price, C. Eric	Regular	1.00	Ph.D.	Ph.D.	40

Roy, Samit	Regular	1.00	Ph.D.	Ph.D.	13
Sallam, Khaled A. E.	Regular	1.00	Ph.D.	Ph.D.	10
Spitler, Jeffrey D.	Regular	1.00	Ph.D.	Ph.D.	20
Young, Gary E.	Regular	1.00	Ph.D.	Ph.D.	25

B. Evidence of regional / national reputation and ranking. Our high regional national ranking is partly evidenced by the increased number of applications for our two undergraduate programs, moving from approximately 100 per year five years ago to 135 per year in 2004. During the review period, we admitted to MAE professional school (effectively the junior and senior years) only 90 students per year. Our reputation has substantially increased during this period due to wining or placing highly in national collegiate competitions, most recently evidenced by our Aerospace Engineering student teams wining 1st and 2nd places during the 2004 AIAA Design, Build Fly Competition. Moreover, demand for our graduate program has increased, growing from 111 graduate students enrolled in Fall 01 to 179 students enrolled in Fall 03. Our national ranking in research, however, has remained essentially unchanged during the past 5 years, due primarily to excessive teaching loads, insufficient faculty, and insufficient operational funding. This is all detailed in our Strategic Plan available at www.mae.okstate.edu, with our plans for increasing our national ranking.

C. Scholarly activity. **Complete Appendix B Record of Significant Scholarly, Artistic and/or Creative Work for the past 5 years.** ***(Describe the changes in scholarly activity during the past 5 years.)*** In order to keep the record to manageable size, Appendix B shows only peer-reviewed, archival journal publications, books, and book chapters by the MAE faculty. If conference proceedings publications had been included, the record would be approximately 3 times larger. Our target is that for the tenure-track faculty as a whole, we should average 1.5 archival journal articles, books, book chapters, or published software per tenure track faculty member per year, up from 1.0 per year five years ago. As can be seen from Appendix B, there are 150 publications for 19 tenure track faculty members during this five year period, which averages 1.58 items per year per tenure track faculty member, slightly above our target.

D. Assessment of student achievement of expected learning outcomes for each degree program **(this information should be available in your annual assessment reports). Select 3-5 key expected learning outcomes for each degree program. Identify the primary method used to assess student achievement of the selected outcomes.** ***Please indicate the year(s) the assessment was conducted, the number of program graduates that year, and the number of students assessed.***

Degree Program: B.S. in Aerospace Engineering and B.S. in Mechanical Engineering

Key Expected Outcome	Method used to assess this outcome	Years this assessment conducted	No. of grads/ number assessed
1. Demonstrate an ability to apply knowledge of mathematics, science, and engineering to the mechanical and aerospace engineering disciplines	Weighted Selection 1 of Questions on National Fundamentals of Engineering Exam	2000 2001 2002 2003 2004	45 / 90 50 / 91 65 / 92 47 / 89 65 / 92
2. Demonstrate an ability to identify, formulate, and solve engineering problems	Weighted Selection 2 of Questions on National Fundamentals of Engineering Exam	Same	Same
3. Demonstrate an understanding of professional and ethical responsibility	Weighted Selection 3 of Questions on National Fundamentals of Engineering Exam	Same	Same

Degree Program: M.S. in Mechanical Engineering

Key Expected Outcome	Method used to assess this outcome	Years this assessment conducted	No. of grads/ number assessed
1. Demonstrate ability to write a competent thesis or creative report on an assigned project.	Judgment of MAE faculty advisory committee.	2000 2001 2002 2003 2004	26 / 26 28 / 28 27 / 27 24 / 24 24/ 24
2. Demonstrate ability to successfully give an oral presentation on an assigned thesis or creative component project.	Judgment of MAE faculty advisory committee.	Same	Same
3. Demonstrate ability to successfully solve a substantial assigned problem requiring independent investigation.	Judgment of MAE faculty advisory committee.	Same	Same

Degree Program: Ph.D. in Mechanical Engineering

Key Expected Outcome	Method used to assess this outcome	Years this assessment conducted	No. of grads/ number assessed
1. Demonstrate ability to write a competent dissertation on a high level research investigation creating new knowledge.	Judgment of MAE faculty advisory committee.	2000 2001 2002 2003 2004	4 / 4 3 / 3 3 / 3 4 / 4 3 / 3
2. Demonstrate ability to successfully give at least two oral presentations on a high level research investigation creating new knowledge.	Judgment of MAE faculty advisory committee.	Same	Same
3. Demonstrate ability to successfully identify and lay out a research plan for an important problem to create new knowledge	Judgment of MAE faculty advisory committee.	Same	Same
4. Demonstrate ability to successfully carry out an independent research investigation on an approved project, creating new knowledge.	Judgment of MAE faculty advisory committee.	Same	Same

D. Overview of results from program outcomes assessment **(this information should be available in your annual assessment reports). For each key expected outcome, summarize results of assessment and describe how results have been interpreted relative to that outcome.** ***(To what extent are students achieving each expected outcome? What do assessment results indicate are curricular strengths or areas for improvement / program development?)*** In our most recent 2004 assessment, performance of seniors on the national Fundamentals of Engineering Exam was a key component. The average percent correct answers from our students to questions on this exam, by selected categories, are divided by the national average percent correct. Our target is to be at or above the national average, so our target ratio is 1.0 or higher. Each of these categories corresponds to one of our program outcomes. We track the ratios for each spring and fall offering of this exam, examining trends. For aerospace engineering majors, the trends are upward for all outcomes and equal or exceed our targets. For mechanical engineering majors, the trends are upward and equal or exceed our targets for all outcomes except for Program Outcome f, "An understanding of professional and ethical responsibility", which for the April 04 exam stood at 0.90. We have not yet discovered reasons for this, and have commissioned our undergraduate advisory committee to examine first, the nature of the ethics questions on this exam, and secondly, whether we need to introduce additional ethics material into our coursework. On the other hand, this metric is at variance with a companion "ethics" outcome metric from our senior exit interviews, discussed in what follows.

For our senior exit interviews, we track average student responses on a 5 point scale for each of 11 Program Outcomes, labeled POa through POk, common for both aerospace and mechanical engineering majors. A score of 1 on this scale indicates "Very Dissatisfied", while a score of 5 indicates "Expectations Surpassed". In addition, we track average student responses for extra Program Outcomes that are particular to the mechanical and aerospace engineering programs separately. These Outcomes are labeled MEP01 through MEP04 for the mechanical engineering program and AEP 01 through AEP03 for the aerospace engineering program. Our target level for responses for these interview surveys is 3.0, which signifies satisfaction of the students with their achievement of this outcome. It should be emphasized that we have collected during the past two years extensive data from direct measurement of outcomes in a large number of courses, and this direct outcome measurement correlates very well with the exit interview results. We have met or exceeded our targets in all areas. It is especially noteworthy that Program Outcome POf, "An understanding of professional and ethical responsibility", was assessed through our senior exit interviews, and has remained well above our target level of 3 on a 5 point response scale. This contradicts results from the FE exam, and gives us reason to re-examine our metrics, as well as our instruction for this outcome.

For the M.S.M.E. degree, each graduating student is required to submit either a written thesis or a written report and to hold an oral defense before a committee of at least 3 MAE faculty members. This committee directly assesses the student's written work on his/her assigned project, as well as the quality of the work in the student's oral presentation and his/her responses to questions from the committee members during the oral defense. During the 2003-2004, academic year, assessment results indicated that we may have too many students taking the 2-credit-hour report option (with 33 hours of organized courses) for the M.S. degree, which is less demanding than the 6-credit hour thesis option (with 24 hours of organized courses). Moreover, the quality of some of these reports appears to marginal. Further assessment indicates that the total number of M.S. students who are not bound for the Ph.D. should be reduced.

For the Ph.D. degree, before being admitted to candidacy, each student must first have a faculty advisor who agrees to work with the student through to completion of his/her Ph.D degree, assuming that student successfully completes all the required steps. Students who do not have such a faculty advisor are not admitted for study toward the Ph.D. Once the student has a faculty advisor, he/she must pass a preliminary examination, which consists of defining an appropriate research problem, laying out possible approaches to solve it, writing this work up in a formal report, and defending it orally before his/her Ph.D. committee of at least 4 four faculty members, one of whom must hold an appointment outside the department and be in mathematics, science, or engineering. This examination determines whether or not a student should be allowed to continue. During the 2003-2004 academic year, out of 5 students sitting for the prelim exam, 4 passed and were allowed to continue. The second step in the process is to pass a qualifying exam, which consists of an extensive written report laying out a problem (which may or may not be the same as that in the prelim exam) together with a research plan and progress made on addressing this problem. The student must then also defend this work orally before his/her committee. During 2003-2004 all 4 sitting for the qualifying exam passed. The final step is to pass a final exam, consisting of a written dissertation and oral defense before the committee. During 2003-2004, all 4 sitting for this exam passed. In the assessment of these committees, no deficiencies or suggestions for improvement were found. Further assessment indicates that the proportion of Ph.D. to M.S. students should be increased, with a strategic target of at least 33% of our graduate students admitted to study for the Ph.D.

Uses of Assessment Results:

Assessment results are shared with all MAE faculty through mailings and discussion at MAE faculty meetings. Our Undergraduate Curriculum Committee uses assessment results in making curriculum and course change recommendations to the entire faculty, and such recommendations are discussed and acted upon during MAE faculty meetings.

During 2003-2004, we incorporated into designated required and elective MAE undergraduate courses substantially more material on engineering ethics, to assure that students achieve this outcome. Ethics topics are now included in ENGR 1111 course taken (required) by mechanical and aerospace engineering students, MAE 3033 Introduction to Engineering (required of all MAE undergraduates), MAE 4344 Design Projects (required of all mechanical engineering students), and MAE 4374 Aerospace Systems Design. It will likely take several years before the results of this show up in our outcome assessments. We also have undertaken a study to examine first, the nature of the ethics questions on the national Fundamentals of Engineering (FE) exam (one of our faculty members sits on the FE exam composition and review committee), and secondly, whether we need to introduce additional ethics material into our coursework. From previous years assessment results, we also have continued to provide review sessions in mathematics, prior to students taking the FE exam, as well as changing the required calculus courses from a 5-5 credit hour course sequence to a 4-3-3 hour sequence. Finally, from previous years' assessment results, we have continued to require our students to take a new 3-credit hour course in statistics that includes substantial treatment of design of experiments, and we have incorporated this topic into our key laboratory courses.

At the M.S. level, we have begun upgrading our requirements for admission to graduate study in MAE, eliminating admission to those we feel would want to take the M.S. creative component route, and we are advising newly admitted students that the only acceptable route is to take the M.S. thesis route. Our intent is to drastically reduce the number of students who take the M.S. creative component route.

At the Ph.D. level, we have begun a new strategy to recruit more Ph.D. students into our program by providing rewards to faculty who provide from their grants and contracts full stipends to Ph.D. applicants as part of the recruitment strategy. We also are giving high preference to admitting those M.S. students who indicate that their longer term goal is to pursue a Ph.D.

E. Feedback from program alumni / documented achievements of program graduates ***(Describe achievements of program graduates obtained from other sources such as department-sponsored alumni surveys, alumni advisory boards, professional societies, etc. Summarize alumni survey results for the degree program, including, if available, information on employment and continued education of program graduates and graduates perceptions of program quality)*** Two assessment cycles with input from alumni and employers have been conducted, completed in June 2001 and June 2002, but the June 2002 cycle used the most complete set of tools. For simplicity, we present results for the June 2002 cycle. Figure 1 presents results for Outcomes POa through POe, and Figure 2 presents results for Outcomes POf through POk. (See Criterion I, Paragraph A, for definition of Program Outcomes.) All assessment tools use a satisfaction scale ranging from a low of 1 to a high of 5, with a target level or 3.0 meaning "Meets Expectations", such that we strive to achieve a 3.0 or better on all assessment results.

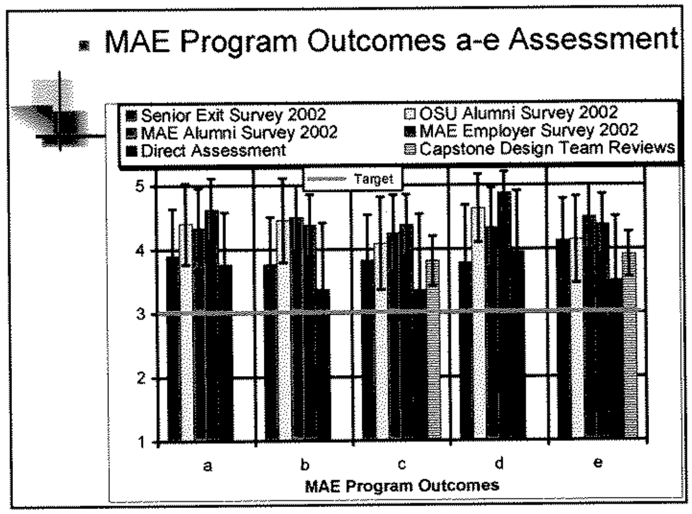

Figure 1 – Assessment Results for POa - POe

Our analysis of the results for POa through POe shows that all alumni, employer, and senior exit surveys, direct assessment results, and capstone design review results are well above the target level of 3.

Figure 2 below present similar results for POf – POk. Our analysis of these results shows that almost all survey, direct assessment, and capstone design review results are well above the target level of 3. The direct assessment data does show a level of 2.75 on POk, but all other tools indicate levels of 3.8 to 4.4, well above the target. The action we have taken is to revisit this after collecting more direct assessment data. Our faculty are new at this type of assessment and in some cases they are measuring attributes they may not have assessed before, and these attributes may be difficult to assess. It is especially noteworthy that the alumni and employer survey results are consistent with results from other assessment tools, as indicated in these Figures.

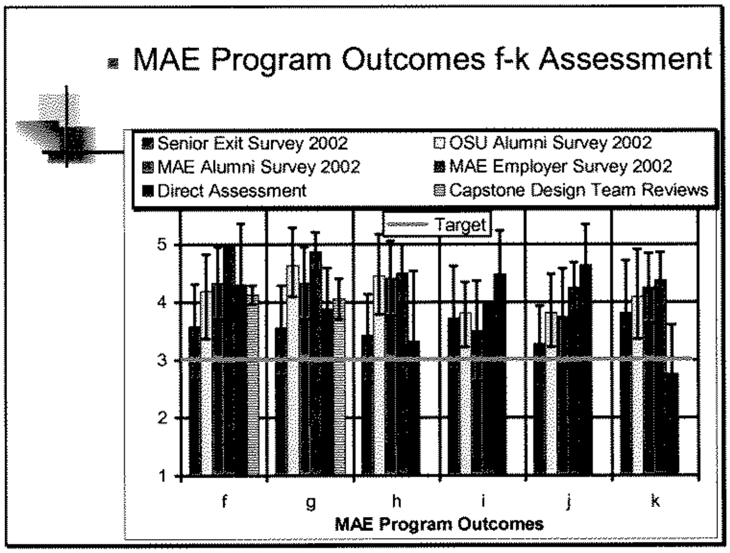

Figure 2 Assessment Results for POf - POk

F. Other Program Evaluations ***(Comment on the results of any outside reviews of the program or any institutional reviews within the last 5 years.)*** During the Fall 2003 semester, both the B.S.A.E. and B.S.M.E. programs were extensively evaluated during a visit by an accreditation team from the national Accrediting Board for Engineering and Technology. Each program was evaluated under separate ABET criteria for that program. The results, received during late summer 2004 were extremely positive, and each program received accreditation for the maximum number of years permitted under ABET guidelines. The written report prepared by the ABET evaluation team and self-study prepared by MAE in preparation for this accreditation visit are too voluminous to include here. ABET evaluators were highly complimentary of all aspects of both programs.

CRITERION VI
Program Demand/Need

A. Occupation Manpower Demand **(If applicable)**

1. **Advisory Committee Membership** – See Appendix C for Membership List.
2. **Advisory Committee Recommendations** – See Appendix D for Recommendations.
3. **School Response to Recommendations** – See Appendix E for Response.
4. **Other sources and documents indicating demand** – NA

B. Societal Needs for the Program. The increasing demand for B.S., M.S., and Ph.D. graduates in mechanical and aerospace engineering has been well documented in recent publications by the Engineering Manpower Commission, the National Academy of Engineering, and the American Society for Engineering Education. These documents are too voluminous to be included here, but they all agree that there is a shortage of mechanical and aerospace engineering graduates, and that this shortage will continue.

C. Graduate student applications and enrollment changes. **Refer to the spreadsheet that lists the number of graduate student applications, acceptances, enrollments, and graduates for the past 3 years. (*Comment on the number of applications, acceptances, and enrollments, and changes over time. For example, if applications are relatively high but***

the department accepts few students, why are most students denied admission? If acceptances are relatively high, but enrollments are low, why do admitted students not enroll? Is the rate of graduations consistent with the enrollment number and the expected time to earn the degree? Then provide a brief explanation of the future plans for the program that will enable it to improve numbers of concern, the time frame required to accomplish these plans, and the budget implications for these plans.)

Graduate student applications and enrollment changes.

Semester	Applications	Accepted	Enrolled	Graduates	Total in program
F01	---	---	---	---	111
Sp02	---	---	---	---	122
F02	317	232	73	9	184
Sp03	81	42	31	19	171
F03	313	132	36	21	179
Sp04	42	16	10	6	177

Complete data on graduate applications and enrollments is available only since Fall 02. As with many programs, fall semester applications and enrollments have almost always been larger than those in the spring semester. As can be seen from the table above, there was little change between the F02 and F03 semesters in the number of applications. However, the Sp04 applications are approximately half the Sp03 applications, portending a dramatic downturn in graduate applications that, in fact has continued into the F04 and Sp05 semesters (data not shown). This downturn should be viewed against the fact that for the past 15 or more years, more than two thirds of our MAE graduate students have been non-U.S. citizens, most of them from the near and far east. In the Spring 03 semester, international students began having difficulty obtaining visas to study in the U.S. This was largely due to the 9/11/01 disaster, which was followed by the severe tightening in U.S. consulates in granting such visas. International students began perceiving the U.S. as an unfriendly place, and European and Australian universities, seeing an opportunity, began recruiting these students more heavily. This decline has occurred at most U.S. universities, where on average, graduate student enrollment declined Fall 04 by almost 40% from the previous year.

Starting in the F03 semester, we began tightening our admissions standards for graduate student admissions, seeking to enroll more Ph.D. bound students and higher quality M.S. students, consistent with OSU, CEAT, and MAE plans to increase the reputational standing of our programs. A program increases its reputation in a number of ways, but having quality graduate students to attract and retain quality faculty is paramount. Moreover, quality doctoral graduates, who are hired by other universities are also a key reputational factor. Thus, compared to F02, in the F032 semester, we accepted 43% fewer students, even though the number of applications remained approximately the same. This resulted in a reduction of 50% in the number of new students actually enrolled. In the last 15 years, graduate student enrollments have always been a fraction of those accepted, primarily due to students getting better offers to better schools. In the F02 and F03 semesters, only 31% and 27%, respectively, of those accepted actually enrolled. We believe the solution to this problem is for OSU to become more competitive by offering substantially more complete tuition waivers (non-resident and resident) to qualified graduate school applicants who are accepted. We also need more and larger fellowships, particularly at the doctoral level. It is not reasonable to expect the faculty, already strained in finding external funding, to also find tuition and fellowship support funds. They are already struggling to secure funds for competitive research assistantships. Accordingly, this will require a substantial increase in funding from the State to recruit and retain good numbers of quality graduate students. In order to restore and grow our program, this must happen immediately and continue over the near and far terms.

As to rate of graduation, the average time for graduation for M.S.M.E. candidates is 2.5 full calendar years, while that for a Ph.D. is 3.5 full calendar years beyond the M.S.M.E. degree. Given this, our graduation rates appear to be consistent with enrollment trends.

CRITERION VII
Program Duplication

A. Identify other degree programs at OSU with similar titles or functions ***(include degree programs in the department if the department has more than one degree program at a degree level (e.g., BS and BA)).*** In CEAT, the degree B.S.M.E.T (B.S. in Mechanical Engineering Technology) might be considered similar, but in fact it is entirely different, and undergoes an entirely different accreditation process. Standards for faculty in this program and acceptance standards for students into this program are not as stringent. For example, graduates of this program are not acceptable into the M.S.M.E. program at OSU.

B. For similar programs, describe how each degree program fulfills unique student needs ***(A program may be unique because of the subject matter treated, the students served, the educational methods employed, the effect of the achievements of the program on other institutions or agencies, etc.)*** Not applicable – see A. above.

Summary and Recommendations

Note-information for this section may come from a variety of sources and should include information about program strengths and areas for improvement that have been described in the *program's outcomes assessment reports.*

A. Strengths: Highly qualified and motivated faculty and staff; generally well-taught courses; well-qualified students at the undergraduate and graduate levels, with strong work ethic; strong support from CEAT; experienced and effective management at the departmental level; excellent research facilities and equipment; enthusiastic support from employers and Industrial Advisory Board.

B. Areas for Improvement: Increase in number of tenure track faculty; increase in faculty salaries to be at parity with Big 12 institutions; increase in allocated operational funds for the School; increase in quantity and amounts of full tuition waivers for graduate students, both domestic and international; reduced teaching loads for faculty; increased staff support for faculty; improved efficiencies in OSU-provided services, including accounting systems, information technology support, and physical plant support; and increase in extramural funding secured by faculty.

C. Recommendations for Action: Convince OSU administration to remedy the areas listed in B. above; assuming increases in salary are secured, use resources to reward faculty for increased research productivity, as well as increased teaching effectiveness.

D. Five-Year Goals for the Program – See Appendix F – Mission Statement and Five Year Goals and Objectives, School of MAE, 1999 - 2004

APPENDIX A

External Grants and Contracts Awarded to Program Faculty

APPENDIX A
Mechanical & Aerospace Engineering
External Grants and Contracts Awarded to Program Faculty

External Funds			Dollar Amounts				
Name of Grant, Contract, or Gift	**Principal Investigator(s)**	**Source of Funds**	**1999-2000**	**2000-2001**	**2001-2002**	**2002-2003**	**2003-2004**
Aeroservoelastic and Flight Dynamics Modeling with Comparisons To Flight Test Data	Arena, A.S.	NASA Dryden Flight Research Center	$22,000		($15,266)		
CFD-Based Aeroservoelastic and Flight Dynamics Analysis of a Flight Research Vehicle	Arena, A.S.	NASA Dryden Flight Research Center	$55,607	$59,995			
CFD-Based Multidisciplinary Analysis of Flight Vehicle Simulation and Control	Arena, A.S.	Advanced Engineering Solutions for NASA				$50,000.00	$150,082
Designated Grant Consortium Competition Augmentation Program	Arena, A.S.	University of Oklahoma for NASA				$59,981.00	
GSRP - Experimental Investigation of Air Flow within Partially Blocked Cavities with Emphasis on Forces on the Blocking Object	Arena, A.S.	Glenn Research Center for NASA Dryden Flight Research Center					$24,000.00
Oklahoma Space Grant Consortium	Arena, A.S.	University of Oklahoma for NASA	$58,000	$50,000	$2,676	$50,000	$124,769
Prediction of Aeroelastically Coupled Aircraft and Sensor Configurations with Comparisons to Flight Test Data	Arena, A.S.	Glenn Research Center for NASA Dryden Flight Research Center			$22,000	$24,000	
Workforce Development	Arena, A.S.	University of Oklahoma for NASA				$12,500.00	$12,500

Freeform-Fabricated Core Composite Manufacturing	Arena, A.S., Lu, H.	Freeform Composites, Inc. for OCAST		$80,000	$5,000		
Freeform Core Composites: Fabrication, Core Structural Optimization and Core Material Enhancement	Arena, A.S., Roy, S., Lu, H.	University of Oklahoma for OSRHE			$21,000.00		
Distribution Dynamics of Active Flow Control	Chambers, F.W.	University of Oklahoma for NASA				$21,000.00	
Mercury Marine R&D Intern Program	Chambers, F.W.	Mercury Marine				$92,382.33	$52,871
Mercury Marine R&D Intern Program	Chambers, F.W.	Oklahoma Center for the Advancement of Science and Technology			$50,000.00	$50,000	$24,000
Airjet Technology in Web Handling	Chang, Y.B.	Web Handling Center (OSUF)	$29,900				
Effect of a Nip Roller on the Air Entrainment	Chang, Y.B.	Web Handling Center (OSUF)	$1,100	($47.19)			
BAe 146 Fire Fighting Tanker Modifications	Falk, E.A.	J2 Engineering, Inc.					$5,000.00
Effects of Trailing-Edge Geometry on Transonic IGV-Rotor Interactions	Falk, E.A.	Ball Aerospace & Technologies Corporation				$4,728.00	
High Cycle Fatigue Damage Accumulation in Aircraft Engines by Probabilistic Microplastic Energy Dissipation	Falk, E.A.	Universal Technology Corporation for U.S. Air Force				$4,467.00	$12,167
Influence of Blade-Row Interactions on Stage Spanwise Efficiency	Falk, E.A.	Universal Technology Corporation for U.S. Air Force					$56,300.00
Cold Air Distribution in a Factory Built Home	Fisher, D.E.	Oklahoma Center for the Advancement of Science and Technology			$53,520.00		
Cold Air Distribution in a Factory Built Home	Fisher, D.E.	Quantum Construction Technologies, Inc.			$53,861.28		

Development of Loop Based HVAC Systems for EnergyPlus	Fisher, D.E.	University of Illinois for US Army Construction Engineering Research Laboratories (USA-CERL)	$130,264				
Experimental Investigation of Mixed Convection Heat Transfer in Buildings	Fisher, D.E.	Environmental Institute's Energy Research Center	$25,000				
Lighting Heat Gain Distribution in Buildings	Fisher, D.E.	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.					$98,419.00
Model Development and Experimental Validation for the EnergyPlus Simulation	Fisher, D.E.	Ernest Orlando Lawrence Berkeley National Laboratory		$81,869			
Integration of Low Energy Technologies for Optimal Building & Space Condition Design	Fisher, D.E., Spitler, J.D.	Department of Energy			$151,925.00	$233,369	$231,842
Experimental Validation of Heat Balance/Radiant Time Series (RTS) Cooling Load Calculation	Fisher, D.E., Spitler, J.D.	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.	$176,663				
Optimal A/C Cycles for 21st Century Refrigerants	Fisher, D.E., Spitler, J.D.	Oklahoma Center for the Advancement of Science and Technology			$110,745.00	$111,058	$67,487
Optimal A/C Cycles for 21st Century Refrigerants	Fisher, D.E., Spitler, J.D.	York International Corporation Unitary Products Group			$78,015	$95,347	$114,304
Research Related to the Production of Titanium Dioxide	Ghajar, A.J.	Kerr-McGee	$61,844	$43,592	$30,000	$48,937	$29,726
Thermal Management of Microchannels	Ghajar, A.J.	Sandia National Laboratories for US Department of Energy					$25,000.00

Analysis of Winding Thick Gauge Aluminum Rolls	Good, J.K.	Aluminum Company of America				$39,722.00	
Dynamic Coefficient of Traction Between Web Media and Rollers	Good, J.K.	Web Handling Center (OSUF)	$57,050	$4,000	$11,580		
Web Wrinkling - Prediction and Failure Analysis	Good, J.K.	Web Handling Center (OSUF)	$25,700	$11,500	$69,858.00	$35,000	$61,500
Mechanical Behavior of a Web During Winding	Good, J.K., Shelton, J.J.	Web Handling Center (OSUF)	$123,100	$59,000	$196,880.00	$90,000	$219,000
A Center for Product and Process Development and Commercialization for Small U.S. Manufacturers	Hoberock, L.L.	National Science Foundation					$201,435.00
Enhancing the Oklahoma Alliance for Manufacturing Excellence with Applications Engineers in Rural Areas	Hoberock, L.L.	Oklahoma Alliance for Manufacturing Excellence, Inc.	$499,431.00	$265,500.00	$277,800.00	$236,063.00	$221,296.00
Enhancing the Oklahoma Alliance for Manufacturing Excellence with Applications Engineers in Rural Areas - Income Accounts	Hoberock, L.L.	Oklahoma Alliance for Manufacturing Excellence, Inc. for private sponsors	$22,281	$1,116		$4,461	
New Product Development Center for Small Rural Manufacturers (NPDC)	Hoberock, L.L.	Oklahoma Department of Commerce				$21,512.52	$55,335.00
New Product Development Center For Small Rural Manufacturers (NPDC)	Hoberock, L.L.	Oklahoma Water Resources Board				$7,170.67	
Modeling of the Ultra-Precision Machining Process Using New Combined Molecular Dynamics/Monte Carlo (MD/MC) Simulation - REU Supplement	Komanduri, R.	National Science Foundation				$6,000.00	
Science and Engineering Research Center for Durable Miniaturized Systems	Komanduri, R.	University of Arkansas for National Science Foundation		$50,205		$85,645	

Science and Engineering Research Center for Durable Miniaturized Systems Cost Share	Komanduri, R.	Oklahoma State Regents for Higher Education				$48,680.70	
Tribological Interactions in Polishing of Advanced Ceramics and Glasses - REU Supplement	Komanduri, R.	National Science Foundation	$10,000				
US-India Cooperative Reearch: Magnetic Field Assisted Finishing Process	Komanduri, R.	National Science Foundation				$23,700.00	
WORKSHOP: Unsolved Problems and Research Needs in Thermal Analysis of Material Removal Processes; Stillwater, OK, October 23-25, 2002 Income Account	Komanduri, R.	Various Conference Registration Fees					$13,870.00
WORKSHOP: Unsolved Problems and Research Needs in Thermal Analysis of Material Removal Processes; Stillwater, OK, October 23-25, 2002	Komanduri, R.	National Science Foundation				$33,759.00	
Fundamental and Technological Aspects of Finishing Balls of Advanced Ceramics, Glasses, and Silicon Using Magnetic Field Assisted Polishing	Komanduri, R.	National Science Foundation		$110,000.00	$100,000.00	$100,000	
Fundamental and Technological Aspects of Finishing Balls of Advanced Ceramics, Glasses, and Silicon Using Magnetic Field Assisted Polishing - REU Supplement	Komanduri, R.	National Science Foundation			$6,000.00		
Modeling of High Speed Machining of Difficult-to-Machine Materials	Komanduri, R.	National Science Foundation	$100,000	$75,000	$75,000		

Modeling of High Speed Machining of Difficult-to-Machine Materials - REU Supplement	Komanduri, R.	National Science Foundation			$12,000.00		
Modeling of the Ultra-Precision Machining Process Using New Combined Molecular Dynamics/Monte Carlo (MD/MC) Simulation	Komanduri, R.	National Science Foundation			$71,818.00	$140,360	
Multiscale Modeling and Simulation of Material Processing	Komanduri, R., Roy, S., Lu, H.	Air Force Office of Scientific Research				$435,617.00	
Multiscale Modeling and Simulation of Material Processing Cost Share	Komanduri, R., Roy, S., Lu, H.	Oklahoma State Regents for Higher Education				$87,965.00	
Development of a Low Maintenance pH Probe for Application to Water and Waste Water Industries	Lowery, R.L.	New Product Development Center for the Oklahoma Department of Commerce					$73,088.00
Development of a Low Maintenance pH Probe for Application to Water and Waste Water Industries	Lowery, R.L.	TechTrol, Inc.					$5,000.00
Accelerated Material Property Testing of ETR35 Used in Grommet Assembly	Lu, H.	Medtronic, Inc.					$5,000.00
Accelerated Material Property Testing Project	Lu, H.	Medtronic, Inc.	$15,000				
CAREER: Measurements of Local Viscoelastic Properties by Nanoindentation	Lu, H.	National Science Foundation	$210,000	$25,000	$25,000	$25,000	$25,000
Characterization and Modeling of Local Viscoelastic, Fracture and Delaminaton Behavior of Nano-structured Polymeric Films and Coatings	Lu, H.	NASA Langley Research Center					$41,388.00

Characterization of Material Mechanical Properties and Failure Modes/Criteria, Including Long-Term Behaviors of a Custom Polymer Coating and Substrate Alloyed Wire/Coil	Lu, H.	Medtronic, Inc.					$37,500.00
Custom Mechanical Parts Qualification	Lu, H.	Alpine Electronics Manufacturing of America, Inc.			$5,000		
Fracture Mechanics Study of Web Runnability and Slitting	Lu, H.	Web Handling Center (OSUF)	$31,100				
Fundamental Investigation of Web Slitting Processes	Lu, H.	3M	$15,000	$15,000			
Runnability of Webs Following Slitting Processes	Lu, H.	Web Handling Center (OSUF)		$22,000	$25,726		
Shear Slitting of Aluminuim Webs	Lu, H.	Aluminum Company of America	$40,000	$30,000.00	$30,000		
Viscoelastic & Hygroscopic Effects on the Formation of Baggy Lanes in Webs	Lu, H.	Web Handling Center (OSUF)				$5,000.00	$57,000
Acquisition of a High Speed Digital Camera for Advanced Materials, Processing and Dynamic Events Research	Lu, H., Falk, E.A., Good, J.K., Komanduri, R., Moretti, P.M.	National Science Foundation					$251,725.00
Creation of Epitaxy-Ready ZnO Substrates	Lucca, D.A.	Eagle-Picher Technologies			$152,183.49	$79,479.13	
Creation of Epitaxy-Ready ZnO Substrates	Lucca, D.A.	Oklahoma Center for the Advancement of Science and Technology			$95,505.00	$99,580	$103,876
GOALI: Creation of Crystalline Surfaces for Short Wavelength Light Emitters - REU Supplement	Lucca, D.A.	National Science Foundation					$6,000.00
GOALI: Creation of Crystalline Surfaces for Short Wavelength Light Emitters	Lucca, D.A.	National Science Foundation		$100,000.00	$100,000	$100,000	

Subsurface Damage in II-VI Semiconductors	Lucca, D.A.	Oklahoma Center for the Advancement of Science and Technology	$99,135				
U.S.-Germany Cooperative Research: Process Chains for the Replication of Complex Optical Components: High Resolution Surface Zone Analysis	Lucca, D.A.	National Science Foundation			$122,558.00		$24,511
US-Germany Cooperative Research: High Resolution Surface Zone Analysis in the Transregional Center on Process Chains for the Replication of the Complex Optical Components	Lucca, D.A.	National Science Foundation					$200,411.00
DSP-Based Nonlinear Control of Advanced Disk Drives	Misawa, E.A.	Oklahoma Center for the Advancement of Science and Technology	$28,000		$130,000		
DSP-Based Nonlinear Control of Advanced Disk Drives	Misawa, E.A.	Seagate Technology	$31,994		$137,010	$43,350	
Genomics of Plant Stress Tolerance	Misawa, E.A.	Arizona Board of Regents, University of Arizona for National Science Foundation	$96,761	$66,384			
Genomics of Plant Stress Tolerance	Misawa, E.A.	University of Illinois for National Science Foundation				$71,680.00	
GOALI: Nonlinear Control of Advanced Hard Disk Drives	Misawa, E.A.	National Science Foundation	$81,271	$83,605	$85,098		
GOALI: Nonlinear Control of Advanced Hard Disk Drives	Misawa, E.A.	Seagate Technology	$25,000	$50,000			
REU/RET GOALI: Nonlinear Control of Advanced Hard Disk Drives	Misawa, E.A.	National Science Foundation			$26,813.00		

Nonlinear Guidance and Tracking Algorithm Development	Misawa, E.A., Pagilla, P.R.	Raytheon Company				$30,000.00	
Dynamic Instability and "Buzz" at Air Turn	Moretti, P.M.	Web Handling Center (OSUF)	$5,000	$18,338			
Measurements on Air Bar/Web Interaction for the Determination of Lateral Stability of a Web in Flotation Ovens	Moretti, P.M.	Web Handling Center (OSUF)		$4,599			
Out-of-Plane Dynamics of a Moving Web	Moretti, P.M.	Web Handling Center (OSUF)					$65,500
Out-of-Plane Dynamics of a Web at an Air Reverser	Moretti, P.M.	Web Handling Center (OSUF)		$5,000	$7,642.86	$6	
Out-of-Plane Dynamics of a Moving Web	Moretti, P.M., Chang, Y.B.	Web Handling Center (OSUF)		$5,500	$31,540	$16,000	
Z Dynamics	Moretti, P.M., Chang, Y.B.	Web Handling Center (OSUF)	$57,300				
Measurement of Air-Bar/Web Interaction for Stability and Performance	Moretti, P.M., Shelton, J.J.	Web Handling Center (OSUF)	$5,000	$5,000	$15,101.00	$1,314	
CAREER: Robust Controllers for Large-Scale Interconnected Systems: Applications to Web Handling Systems	Pagilla, P.R.	National Science Foundation	$200,000				
Dynamics of Motor, Controller, and Mechanical Drive for Tension Control	Pagilla, P.R.	Web Handling Center (OSUF)				$5,000.00	$52,000.00
The Role of Active Dancers in Tension Control of Webs	Pagilla, P.R.	Web Handling Center (OSUF)	$15,550	$9,500	$44,984.00		$12,205
Adaptive Control of Web Guides	Pagilla, P.R., Reid, K.N.	Fife Corporation					$22,333.86
Adaptive Control of Web Guides	Pagilla, P.R., Reid, K.N.	Oklahoma Center for the Advancement of Science and Technology					$50,000.00

Modeling and Advanced Control of Web Handling Systems	Pagilla, P.R., Reid, K.N.	Fife Corporation	$16,389		$10,594	$1,804	
Modeling and Advanced Control of Web Handling Systems	Pagilla, P.R., Reid, K.N.	Oklahoma Center for the Advancement of Science and Technology	$39,400	$39,400			
Modeling and Advanced Control of Web Handling Systems	Pagilla, P.R., Reid, K.N.	OSU Foundation (Fife)	$25,000	$25,000			
Web Transport Systems	Reid, K.N.	Web Handling Center (OSUF)		$5,000			$10,000
Characterization of Environmental Durability of Polymer Matrix Composite	Roy, S.	NASA Glenn Research Center			$31,660.00		
Micro-Macro Modeling of the External Strengthening of Concrete with Fiber Reinforced Polymer	Roy, S.	National Science Foundation			$111,148.00	$71,393	
Modeling the Interaction between Permeability and Damage in Polymer Matrix Composite (PMC) Laminates for the Reusable Launch Vehicle (RLV)	Roy, S.	NASA Langley Research Center			$80,112.00	$82,322	$91,332
NanoNet Seed Grant	Roy, S.	National Science Foundation					$9,343.00
Numerical Analysis of the Role of Interstitial Ice in Composites Fracture	Roy, S.	US Army Engineer Research and Development Center				$2,000.00	
Characterization and Modeling of Nanostructured Aerogels	Roy, S., Lu, H.	University of Oklahoma for NASA					$11,255.00
Characterization and Modeling of Nanostructured Aerogels	Roy, S., Lu, H.	University of Oklahoma for OSRHE					$9,410.00
Nano Particles Generation by Electrostatic Breakup of Liquid Metal Jets	Sallam, K.A.	Oklahoma EPSCoR for Oklahoma State Regents for Higher Education					$40,599.00

Lateral Control of a Web	Shelton, J.J.	Web Handling Center (OSUF)	$1,000		$883		$1,628
Bearings for Web-Driven Rollers	Shelton, J.J., Feiertag, B.A., Chang, Y.B.	Web Handling Center (OSUF)	$3,050	$4,499			
Geothermal Heat Pump Design Assistance and Technology Distribution	Spitler, J.D.	Department of Energy	($19,209)				
Measurement of Soil/Rock Formation Effective Thermal Properties at Four Test Wells in Lincoln, Nebraska	Spitler, J.D.	Lockheed Martin Energy Research Corporation		($13.26)			
Oklahoma State University Geothermal Smart Bridge Administration	Spitler, J.D.	United States Department of Transportation - Federal Highway Administration	$104,839	$74,233	$17,000	$37,895	
Oklahoma State University Geothermal Smart Bridge Task 4.1.1 Develop and Validate Advanced Modeling Software	Spitler, J.D.	United States Department of Transportation - Federal Highway Administration	$247,334	$183,269.00		$63,118	
Oklahoma State University Geothermal Smart Bridge Task 4.3.1.2 Surrogate Bridge Freezing Sensors	Spitler, J.D.	United States Department of Transportation - Federal Highway Administration	$156,517	$45,031		$11,368	
Oklahoma State University Geothermal Smart Bridge Task 4.3.2 Investigating Summer Recharge Strategies	Spitler, J.D.	United States Department of Transportation - Federal Highway Administration	$60,232	$83,487		$46,875	
R&D Studies Applied to Standing Column Well Design	Spitler, J.D.	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.	$135,323				

Oklahoma State University Geothermal Smart Bridge Task 4.4.1 Corrosion Assessment and Control	Spitler, J.D.	United States Department of Transportation - Federal Highway Administration			$98,833.24	$27,414.00	
Oklahoma State University Geothermal Smart Bridge Task 4.1.2 Develop Design Software	Spitler, J.D., Delahoussaye, R.D.	United States Department of Transportation - Federal Highway Administration	$92,619	$60,206		$51,622	
Updating the ASHRAE/ACCA Residential Heating and Cooling Load Calculation Procedures and Data	Spitler, J.D., Fisher, D.E.	Wrightsoft Corporation for American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.			$77,489.00		
		Total	**$3,216,545.31**	**$1,851,767.92**	**$2,846,293.15**	**$3,125,645.05**	**$3,007,008.06**

APPENDIX B

Record of Significant Scholarly, Artistic, and/or Creative Work

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Record of Significant Scholarly, Artistic and/or Creative Work

Name and Type of Scholarly, Artistic and/or Creative Work	Program Faculty	Year Completed (1999-2005)
Archival Journal Publication: Cowan, T. J., Arena, Jr., A. S., and Gupta, K. K., "Development of a Discrete-Time Aerodynamic Model for CFD-Based Aeroservoelastic Analysis," *Journal of Aircraft*, In Press.	Arena, Jr, Andrew S.	2005 (In press)
Archival Journal Publication: Cowan, T. J., Arena, Jr., A. S., and Gupta, K. K., "Accelerating CFD-Based Aeroelastic Predictions using System Identification," *Journal of Aircraft*, Vol. 38, No. 1, January-February, 2001.	Arena, Jr, Andrew S.	2001
Archival Journal Publication: "Optimization Technique for Design of Automotive Air Filter Housings with Improved Fluid Dynamic Performance and Filtration," A. Al-Sarkhi and F.W. Chambers, *Particulate Science and Technology*, Vol. 22, No. 3, 2004, pp. 235 - 252.	Chambers, Frank W.	2004
Archival Journal Publication: "Velocity Distribution Effects in Air Filter Testing," F.W. Chambers, A. Al-Sarkhi, and S. Yao. *Particulate Sciences and Technology*, Vol. 19, No. 1, 2001, pp. 1-21.	Chambers, Frank W.	2001
Archival Journal Publication: Iu, I., D. Fisher. 2004. Application of Conduction Transfer Functions and Periodic Response Factors in Cooling Load Calculation Procedures. ASHRAE Transactions, 110(2):829-841.	Fisher, Daniel E.	2004
Archival Journal Publication: Chantrasrisalai, C., D.E. Fisher, I. Iu, and D. Eldridge. 2003. "Experimental Validation of Design Cooling Load Procedures: The Heat Balance Method", ASHRAE Transactions. 109(2):160-173.	Fisher, Daniel E.	2003
Archival Journal Publication: Chantrasrisalai, C., V. Ghatti, D.E. Fisher, and D.G. Scheatzle. 2003. "Experimental Validation of the EnergyPlus Low-Temperature Radiant Simulation", ASHRAE Transactions. 109(2):614-623.	Fisher, Daniel E.	2003
Archival Journal Publication: Eldridge, D., D.E. Fisher, I. Iu, and C. Chantrasrisalai. 2003. "Experimental Validation of Design Cooling Load Procedures: Facility Design", ASHRAE Transactions. 109(2):151-159.	Fisher, Daniel E.	2003
Archival Journal Publication: Iu, I.S., D.E. Fisher, C. Chantrasrisalai, and D. Eldridge. 2003. "Experimental Validation of Design Cooling Load Procedures: The Radiant Time Series Method", ASHRAE Transactions. 109(2):139-150.	Fisher, Daniel E.	2003
Archival Journal Publication: Pedersen, C.O., D.E. Fisher, R.J. Liesen, R.K. Strand. 2003. ASHRAE Toolkit for Building Load Calculations. *ASHRAE Transactions.* 109(1):583-589.	Fisher, Daniel E.	2003
Archival Journal Publication: Spitler, J.D., D. E. Fisher, *On the Relationship between the Radiant Time Series and Transfer Function Methods for Design Cooling Load Calculations,* International Journal of Heating, Ventilating, Air-Conditioning and Refrigerating Research, Vol. 5, Num. 2, April 1999	Fisher, Daniel E.	1999
Archival Journal Publication: Spitler, J.D., D.E. Fisher. 1999. *Development of Periodic Response Factors for Use with the Radiant Time Series Method.* ASHRAE Transactions. Vol, 105, No. 2.	Fisher, Daniel E.	1999
Archival Journal Publication: Ghajar, A. J., Tam, L. M., and Tam, S. K., "Improved Heat Transfer Correlation in the Transition Region for a Circular Tube with Three Inlet Configurations Using Artificial Neural Networks," *Heat Transfer Engineering*, Vol. 25, No. 2, pp. 30-40, 2004.	Ghajar, Afshin J.	2004

Book Chapter: Ghajar, A. J., "Compressible Flow," Chapter 36 in *The Engineering Handbook, 2nd Edition*, edited by R. C. Dorf, CRC Press, Boca Roton, Florida, pp. 36-1 to 36-17, 2004.	Ghajar, Afshin J.	2004
Archival Journal Publication: Sofyan, Y., Ghajar, A. J., and Gasem, K. A. M., "Multiphase Equilibrium Calculations Using Gibbs Minimization Techniques," *Industrial & Engineering Chemistry Research*, Vol. 42, No. 16, pp. 3786-3801, 2003.	Ghajar, Afshin J.	2003
Archival Journal Publication: Sofyan, Y., Ghajar, A. J., and Gasem, K. A. M., "A Systematic Method to Predict Cloud Point Temperature and Solid Precipitation," *Petroleum Science and Technology*, Vol. 21, Nos. 3 & 4, pp. 409-424, 2003.	Ghajar, Afshin J.	2003
Educational Software: Available with the new edition of "Modern Compressible Flow with Historical Perspective" by Anderson, McGraw-Hill, 2003.	Ghajar, Afshin J.	2003
Archival Journal Publication: Kim, D. and Ghajar, A. J., "Heat Transfer Measurements and Correlations for Air-Water Flow of Different Flow Patterns in a Horizontal Pipe," *Experimental Thermal and Fluid Science*, Vol. 25, No. 8, pp. 659-676, 2002.	Ghajar, Afshin J.	2002
Book Chapter: Zurigat, Y. H. and Ghajar, A. J., "Heat Transfer and Stratification in Sensible Heat Storage Systems," Chapter 6 in *Thermal Energy Storage Systems and Applications*, edited by I. Dincer, and M. A. Rosen, John Wiley & Sons, UK, pp. 259-301, 2002.	Ghajar, Afshin J.	2002
Archival Journal Publication: Kim, D., Ghajar, A. J., and Dougherty, R. L., "Robust Heat-Transfer Correlations for Turbulent Gas-Liquid Flow in Vertical Pipes," *Journal of Thermophysics and Heat Transfer*, Vol. 14, No. 4, pp. 574-578, 2000.	Ghajar, Afshin J.	2000
Archival Journal Publication: Kim, D., Ghajar, A. J., Dougherty, R. L., and Ryali, V. K.,"Comparison of 20 Two-Phase Heat Transfer Correlations with Seven Sets of Experimental Data, Including Flow Pattern and Tube Inclination Effects," *Heat Transfer Engineering*, Vol. 20, No. 1, pp. 15-40, 1999.	Ghajar, Afshin J.	1999
Archival Journal Publication: Whitelock, D. P., Brusewitz, G. H. and Ghajar, A. J., "Thermal/Physical Properties Affect Predicted Weight Loss of Fresh Peaches," *Transactions of the ASAE*, Vol. 42, No. 4, pp. 1047-1053, 1999.	Ghajar, Afshin J.	1999
Archival Journal Publication: "The Evaluation of Two Autologous Tendon Grafting Techniques in Ponies," S.R. Reiners, H.W. Jann, L.D. Stein, J.K. Good, and P.L. Claypool, Veterinary Surgeon, V. 31, No. 2, 2002.	Good, J. Keith	2002
Book: Proceedings of the Sixth International Conference on Web Handling, edited by J.K. Good, Oklahoma State University, 2002.	Good, J. Keith	2002
Archival Journal Publication: "A Numerical Algorithm for Determining the Traction Between a Web and a Circumferentially Grooved Roller," K.S. Ducotey and J.K. Good, ASME Journal of Tribology, V. 122, July 2000.	Good, J. Keith	2000
Book: Proceedings of the Fifth International Conference on Web Handling, edited by J.K. Good, Oklahoma State University, 1999.	Good, J. Keith	1999
Archival Journal Publication: "Using Robust Stability Analysis Theorems For Robust Controller Design" (with P. Ngamsom), ASME Journal of Dynamic Systems, Measurement, and Control, Vol. 125, December 2003.	Hoberock, Lawrence L.	2003
Archival Journal Publication: Komanduri, R. and Z. B. Hou, "Thermal Analysis of Shear Instability in the Machining of Titanium Alloys," *Metallurgical and Materials Transactions* 33A (2002) 2995-3010.	Komanduri, Ranga	2002
Archival Journal Publication: Komanduri, R. and L. M. Raff, "A Review on the Molecular Dynamics (MD) Simulation of Machining," *Proc. of the I. Mech. E.* (Lon) 215 B (2001) 1639-1672.	Komanduri, Ranga	2001

Archival Journal Publication: Komanduri, R. and Z. B. Hou, "A Review of the Experimental Techniques for the Measurement of Heat and Temperatures Generated in Some Manufacturing Processes and Tribology," *Tribology International* 34 (2001) 653-682.	Komanduri, Ranga	2001
Archival Journal Publication: Komanduri, R., "Proposal for a New Course on the Thermal Aspects of Manufacturing," Guest Editorial, *Heat Transfer Engineering* 22 (2001) 1-3.	Komanduri, Ranga	2001
Archival Journal Publication: Komanduri, R., and Z. B. Hou, "Thermal Analysis of the Laser Surface Transformation Hardening Process," *Int. J of Heat and Mass Transfer* 44 (2001) 2845-2862.	Komanduri, Ranga	2001
Archival Journal Publication: Komanduri, R., Chandrasekaran, N., and L. M. Raff, "Molecular Dynamics Simulation of the Nanometric Cutting of Silicon," *Philosophical Magazine* B 81 (2001) 1989-2019.	Komanduri, Ranga	2001
Archival Journal Publication: Komanduri, R. and Z. B. Hou, "Thermal Analysis of the Arc Welding Process: Part I General Solutions," *Metallurgical and Materials Transactions* 31B (2000) 1353-1370.	Komanduri, Ranga	2000
Archival Journal Publication: Komanduri, R. and Z. B. Hou, "Tribology in Metal Cutting: Some Thermal Issues," *Trans ASME J of Tribology* 123 (2000) 799-815.	Komanduri, Ranga	2000
Archival Journal Publication: Komanduri, R., Chandrasekaran, N., and L. M. Raff, "MD Simulation of Single Crystal Aluminum - Effect of Crystal Orientation and Direction of Cutting," *Wear* 242 (2000) 60-88.	Komanduri, Ranga	2000
Archival Journal Publication: Komanduri, R., Chandrasekaran, N., and L. M. Raff, "MD Simulation of Atomic Scale Friction," *Physical Review* B 61 (2000) 14007-14019.	Komanduri, Ranga	2000
Archival Journal Publication: Yan. J., Yoshino, M., Kuriagawa, T., Shirakashi, T., Syoji, K. and R. Komanduri, "On the Ductile Machining of Silicon for Micro Electro Mechanical (MEMS), Opto-electronic and Optical Applications," *Materials Science and Engineering*, B 297/1-2 (2000) 230-234.	Komanduri, Ranga	2000
Archival Journal Publication: Zhen Bing Hou and R. Komanduri, "General Solutions for Stationary/Moving the Plane Heat Source Problems in Manufacturing and Tribology" *Int. J of Heat & Mass Transfer* 43 (2000) 1679-1698.	Komanduri, Ranga	2000
Archival Journal Publication: Komanduri, R., Hou, Z. B., Umehara, N., Raghunandan, M., Ming Jiang, Bhagavatula, S. R., Noori-Khajavi, A., and N. O. Wood, "A 'Gentle' Method for Finishing Si_3N_4 Balls for Hybrid Bearing Applications," *Tribology Letters* 7 (1999) 39-49.	Komanduri, Ranga	1999
Archival Journal Publication: Mallika, K. and R. Komanduri, "Low Pressure Microwave CVD Diamond Coatings on Cemented Tungsten Carbide Tools," *Wear* 224 (1999) 245-266.	Komanduri, Ranga	1999
Book Chapter: "Thermal Destruction of Wastes and Plastics," with A. K. Gupta, in A. A. Andrady (Editor) "Plastics and the Environment," Wiley-Interscience, Hoboken, NJ, 2003, pp. 629-696.	Lilley, David G.	2003
Archival Journal Publication: "Comparison of Criteria for Room Flashover," with H.-J. Kim, Journal of Propulsion and Power, Vol. 18 No 3, May-June 2002, pp. 674-678.	Lilley, David G.	2002
Archival Journal Publication: "Flashover: A Study of Parameter Effects on Time to Reach Flashover Conditions," with H.-J. Kim, Journal of Propulsion and Power, Vol. 18 No 3, May-June 2002, pp. 669-677.	Lilley, David G.	2002
Archival Journal Publication: "Heat Release Rate of Burning Items in Fires," with H.-J. Kim, Journal of Propulsion and Power, Vol. 18 No 4, July-Aug 2002, pp. 866-870.	Lilley, David G.	2002
Archival Journal Publication: "Fire Development Calculations," Journal of Propulsion and Power, Vol 16 No 4, July-Aug 2000, pp. 641-648.	Lilley, David G.	2000

Archival Journal Publication: "Minimum Safe Distance from Pool Fires," Journal of Propulsion and Power, Vol. 16 No 4, July-Aug 2000, pp. 649-652.	Lilley, David G.	2000
Archival Journal Publication: "Annular Vane Swirler Performance," Journal of Propulsion and Power, Vol. 15 No 2, March-April 1999, pp. 248-252.	Lilley, David G.	1999
Archival Journal Publication: "Energy Recovery Opportunities from Wastes," with A. K. Gupta, Journal of Propulsion and Power, Vol. 15 No 2, March-April 1999, pp. 175-180.	Lilley, David G.	1999
Archival Journal Publication: "Fire Dynamics – A Primer," Journal of Propulsion and Power, Vol. 15 No 2, March-April 1999, pp. 204-215.	Lilley, David G.	1999
Archival Journal Publication: B. Wang, H. Lu, G. Tan and W. Chen, "Strength of Damaged Polycarbonate after Fatigue," *Theoretical and Applied Fracture Mechanics*, Vol. 39, No. 2, pp. 163-169, 2003	Lu, Hongbing	2003
Archival Journal Publication: H. Lu, B. Wang, J. Ma, G. Huang and H. Viswananthan, "Measurement of Creep Compliance of Solid Polymers by Nanoindentation," *Mechanics of Time-Dependent Materials* , Vol. 7, pp. 189-207, 2003	Lu, Hongbing	2003
Educational Software: CreepCalculator uses the method described in the paper "Measurement of Creep Compliance of Solid Polymers by Nanoindentation," H. Lu, B. Wang,J. Ma,G. Huang and H. Viswanathan, *Mechanics of Time-Dependent Materials*, Vol. 7, pp. 189-207, 2003.	Lu, Hongbing	2003
Archival Journal Publication: B. Wang, H. Lu and G. Kim, "A Damage Model for the Fatigue Life of Elastomeric Materials," *Mechanics of Materials*, Vol. 34, No. 8, pp. 475-483, 2002	Lu, Hongbing	2002
Archival Journal Publication: H. Lu, B. Wang, G. Tan and W. Chen, "Accelerated Life Prediction and Testing of Structural Polymers under Cyclic Loading," *Long Term Durability of Structural Materials*, pp. 195-206, Edited by P.J.M. Monteiro, K.P. Chong, J. Larsen-Basse and K. Kompoulos, Elsevier, 2001	Lu, Hongbing	2001
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APPENDIX C

Membership – MAE Industrial Advisory Board

APPENDIX C
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APPENDIX D

Recommendations of MAE Industrial Advisory Board

Oklahoma State University
Mechanical and Aerospace Engineering
Industrial Advisory Board Report
Fall 2002 / Spring 2003 Meeting

Background

The faculty of the MAE School believes that there could be substantial benefits to the academic programs and other activities of the School of Mechanical and Aerospace Engineering at Oklahoma State University by having the scrutiny, comment, and advice from an appropriately chosen group of experienced and impartial professionals in mechanical and aerospace engineering, to be called the MAE Industrial Advisory Board (IAB). Being particularly concerned that the evaluations and recommendations are relevant, the Board should be composed primarily of representatives from industry, but appropriate government representatives may also be included. Industry, as opposed to academia and private individuals, employs the largest numbers, by far, of OSU's mechanical and aerospace engineering graduates.

Purpose

The purpose of the MAE Industrial Advisory Board is to provide advice and counsel to the Head and the Faculty of the School of MAE in order to enhance and improve all programs and operations. The Board will constitute a vital link between mechanical and aerospace engineering practice and education, providing advice that will enable the School to better prepare students both for the practice of engineering and for undertaking engineering research. The Board will also serve to disseminate among practitioners a clear and objective understanding of the manner in which the School is attempting to fulfill this role. Attached as an Addendum is a listing of the current IAB members.

Meeting Report

The OSU MAE IAB met at the CEAT Advanced Technology Research Center on Friday, March 28, 2003. The chairman, Steve Blossom, ran the meeting. In attendance were Dan Blankenship, George Dolezal, John Madden, B. N. Murali, Paul Padgett, and David Plummer.

After a welcome provided by CEAT Dean, Dr. Karl Reid, the Head of the MAE School, Dr. Larry Hoberock, provided insight into the state of the MAE School and the School's response to the last IAB Report published in the Spring of 2002. The morning session was dominated by a presentation by Dr. Keith Good on the school's process, assessment methods, data, and analysis in support of the upcoming ABET review. The board was treated to a tour of the ME laboratory west of campus. Dr. Afshin Ghajar and Dr. Andy Arena presented an overview of their respective Capstone design courses. As a final order of business, the board elected David Plummer as Chairman of the IAB with a term to end in the Fall of 2003.

The OSU Mechanical and Aerospace Engineering Industrial Advisory Board acknowledges and compliments the faculty of the School of Mechanical and Aerospace Engineering, and particularly Dr. Larry Hoberock, for the organization and professionalism of this year's review.

General Comments, Observations, and Suggestions

Regarding specific comments/suggestions for the School of Mechanical and Aerospace Engineering, the IAB offers the following:

1. The IAB appreciates the effort expended on suggested curriculum changes. While MAE was unsuccessful with the Philosophy Department on the Engineering Ethics, the Business College on multidisciplinary teams, and the Mathematics Department on the Advanced Engineering Mathematics Course, the board acknowledges the effort expended by MAE to stand up those courses. The board still strongly believes that multidisciplinary teams are important to the undergraduate experience and encourages the MAE faculty further pursue this opportunity at the appropriate time.
2. The IAB is pleased with the successful creation of a new Engineering Statistics course with a section on Design of Experiments.
3. The number of students in MAE has nearly doubled between academic year 1997 and 2003 (397 vs. 702). The load on the faculty (students per instructor, ABET preparation, Scholars development) has dramatically increased. The board suggests a review of the faculty workload and a concern for faculty burnout.
4. In light of the recent financial difficulties of the school, the board would like to spend more time on the budget, revenue sources, and costs of the school.
5. The board judges recent changes in the pre-professional school curriculum, most notably restructuring calculus, as an improvement.
6. The board observed the faculty working together as a team with a congenial working relationship. The school appears to be operating in a businesslike and professional manner. The integration and buy-in among the faculty is commendable and noteworthy.

Comments, Observations, and Suggestions on Accreditation

1. The IAB acknowledges the volume of work performed for the upcoming ABET accreditation. The board also commends the faculty of MAE for embracing this opportunity for self-examination and improvement.
2. The board was pleased to observe widespread concern for "the undergraduate experience."
3. With regard to the Senior Exit Interview, the board noted that students rarely have enough perspective to judge the quality of the curriculum and instruction they received vs. other university programs. The use of post-graduate surveys (at 2 and 4 years) is crucial.
4. The involvement of the students in a formal advisory (Student Advisory Board) capacity is good. The SAB represents 10-20% of student enrollment in MAE and are probably disproportionately drawn from the best students. Does the SAB truly represent a consensus of student opinion? Does having a subset of the student population exposed to the governance of the school skew the results of the Senior Exit Interview in a self-serving way?
5. The scores from the survey instruments are quite high. Therefore, very few responses of "1" are registered. The board recommends that MAE perform further investigation on respondents answering with "1" in an attempt to clarify root causes.
6. The trend data from the FE exam scores looks like an x-bar control chart. The data could be analyzed to determine if the fluctuations are purely from random variation or if some cause-and-effect, such as pretest review, is a factor.
7. It appears that the Direct Assessment instrument contains an offset making its scores lower than other instruments. The board recognizes that the Direct Assessment tool has only been used one semester. When addition data is collected, the board recommends that the tool is examined and correlated with the other instruments if appropriate.
8. The board recommends that MAE change the ordinate scale of the FE exam trend chart to range from 0.8 to 1.2 for greater clarity.
9. We think MAE is well prepared for the ABET assessment.

Response to the Charge to the MAE IAB

1. In your judgment, are our assessment methods appropriate and adequate for ME? For AE?

   The board believes that the assessment method is appropriate and adequate. We believe that it is properly focused on the outcome. The tools for Direct Assessment may require refinement and greater structure. The board agrees with the target levels set by the faculty and recommends that the faculty establish "stretch goals" for a few criteria judged most important. The board perceived opportunities for the Capstone design courses to provide more data for the assessment, especially for PO4.

2. In your judgment, are our interpretations of assessment results to date on target for ME? For AE?

The board believes the interpretations of the results are valid and good. We suggest that the results of the FE exam should receive more scrutiny. The board placed greater value on the FE exam results that some of the other assessment instruments because of its objective nature and widespread application. The board recognized the complex nature of the debate around requiring the FE exam of all students and did not form a consensus opinion.

3. In your judgment, are our recommendations for ME based on assessment results appropriate and adequate? For AE?

   The board agrees with the recommendations and judges them to be appropriate and adequate. We await additional data and encourage MAE to maintain continuity in the process to build a relevant database. We recommend caution in overreacting to trends in the data. Too many changes, especially in the curriculum, can introduce instability. We appreciate the conservative nature with which the data was interpreted and how metrics were applied to the criteria. We also caution to use patience in assigning cause to discrepancies in the data and encourage the faculty to investigate fully before reaching a conclusion.

4. Do the Educational Objectives remain adequate and appropriate for ME? For AE?

   Yes. The board thought the wording of PEO3 could be somewhat restrictive toward design. Instead of "… who can realize successful designs …", the board offers for consideration, "… who can realize successful products and processes …".

5. Do the Program Outcomes remain adequate and appropriate for ME? For AE?

   Yes.

Conclusion

In conclusion, the IAB is extremely pleased with the continued progress being made by the Faculty and Staff of the Mechanical and Aerospace Engineering School at Oklahoma State University. The School's response to the Spring 2002 report clearly reflects a receptive manner and a desire to improve. In that regard, you are to be complimented on your dedication to further improving what is obviously an outstanding program. The Industrial Advisory Board has provided within this report a series of suggestions for further improvements and we stand ready to assist you as necessary in implementation of appropriate recommendations.

The Board also understands that the School provides more than just a healthy academic environment for the students. The Faculty has been very successful in providing excellent role models for the students, a responsibility that is sometimes lost within the U.S. world of academia. We as an industry are looking to the MAE School to provide industry with high quality engineering graduates. However, we as parents are also looking to the Faculty to watch over and nurture our children. Well done!

APPENDIX E

School Response to Recommendations of MAE Industrial Advisory Board

APPENDIX E
School Response to Recommendations

School of Mechanical and Aerospace Engineering
Oklahoma State University

Faculty Response to Report of the MAE IAB
Covering Meeting of March 28, 2003

April 9, 2004

The MAE faculty expresses its sincere appreciation for the excellent IAB participation and outstanding suggestions given to us during and after the IAB meeting of March 28, 2003. The subject report was sufficiently detailed and carefully prepared to provide the feedback we needed from the IAB. We very much appreciate your timely completion of the subject report, and we were impressed with the insight you provided and the high quality and relevance of the comments.

The following are responses to specific numbered comments in the three sections of the subject IAB report:

General Comments, Observations, and Suggestions

1. Multidisciplinary teaming opportunities with groups of students outside of CEAT continue to be extremely difficult to establish. We have pursued this at both the departmental level and college level, without success. Basically, it takes two to tango, and we have not been able to sell cross college teaming of students with other colleges. Our best information on this aspect is that until we obtain support on this aspect from college level administration in other colleges, we will continue to suffer in this category. As a bright spot, our ABET visitor did not find a weakness or deficiency in this area.

2. Our new statistics course with Design of Experiments continues to provide a richer mix of relevant instruction that our older course.

3. Our faculty workload has been carefully reviewed, with the finding that by comparison with our peer group, our workload is much too high. We have concluded that we must implement reductions in the numbers of both B.S. and M.S. students accepted into our program, and strategies for doing this have been factored into our Strategic Plan.

4. A review of the finances of the School will be presented in the "State of the School" remarks by the School Head, and comparisons with our peer group, together with strategies for addressing, is presented in our Strategic Plan, which will be discussed by the Chair of our Strategic Planning Committee.

5. While we have indeed re-structured calculus, changing from two five-credit courses to one four-credit and two three-credit courses, we have not seen positive changes in the numbers of D, F, I, and W grades. Moreover, scores on the mathematics portions of the FE exam remain below our target. Since this holds for all engineering programs, not just MAE, the College is undertaking a multi-year study to find root causes. Findings are not yet available.

6. Our faculty continues to work well together in a congenial environment. However, the lack of a salary program for the past two years has caused morale problems, and number of our faculty, particularly those with children, are hurting financially. The OSU president has made salary increases his top priority this year, but with actual purchasing power down more than 7 percent over the past 3 years, it is difficult to see how we can catch up. This is probably the most severe problem we have, for both faculty and staff, not only in MAE, but across OSU.

Comments, Observations, and Suggestions on Accreditation.

1. We came through the accreditation process with flying colors, for both our BSME and BSAE programs. While we will not receive the final accreditation action until Summer 2004, every indication is that we will receive "NGR" (Next General Review), which is the top accreditation result that can be obtained and would give accreditation to both programs for the maximum of 6 years.

2. A quality undergraduate experience continues to receive high priority from our faculty.

3. We agree that graduating senior perspectives are somewhat limited, and that post-graduate surveys at 2 and 4 years provide more maturity and balance. We do however, obtain nearly 100% response from graduating seniors. Our difficulty is in getting sufficient alumni responses to have a meaningful data base. We plan to continue to work to increase responses from alumni, although this is resource intensive.

4. The Student Advisory Board members are drawn from those of our students who have demonstrated an interest in and loyalty to MAE. These students also tend to be our better students, as well, and many of them are leaders in various OSU, CEAT, and MAE organizations. We seek advice and input from them because experience has shown that what they tell us will be thoughtful, articulate, and professional. We do not believe that this skews the results of the Senior Exit Interviews. We have six or seven years of using Senior Exit Interviews, but only 3 years of using a Student Advisory Board. We have seen no significant differences in the results since the SAB was formed. Moreover, a number of our SAB members are graduate students, who do not participate in Senior Exit Interviews.

5. The IAB suggested that we undertake an investigation or respondents answering survey questions with a "1" in an attempt to clarify root causes. A "1" indicates "Not Important" on one scale and "Very Dissatisfied" on another scale. Consider that the only students who are accepted into MAE professional school, and therefore eligible to fill out a survey, are those whose GPA is 2.5 or higher, not only overall, but also in math, science, and engineering core courses; in short, only good students get in. Consider further that the curriculum has been undergoing fine tuning for the past 20 years, and has been balance for maximum learning against available student study hours. Finally, consider that faculty are selected to begin with only if they are demonstrably "pro-student". With these considerations, it does not surprise us that very few students and alumni score a survey instrument with "1", and we question whether the study suggested would be a good use of scarce faculty resources.

6. The trend data from the FE exam certainly have some random variation. Moreover, we are aware that pretest review for this exam, just like any pretest review, is indeed a factor. However, these are the same factors that affect FE exams given in every state in the U.S. We are relatively new at using FE exam results for assessment, and have more to learn. We have studied this data very carefully, and one of our faculty members sits on the national exam board which comprises exam questions.

7. Direct assessment is new to us, and we are still learning from it. One factor is that faculty determine this results, rather than students or alums, and faculty often tend to be more critical. We will learn more with experience.

8. We have taken under advisement the IAB's recommendation that the ordinate scale of the FE exam trend chart be changed to range from 0.8 to 1.2 for greater clarity.

9. While we were well prepared for the ABET assessment, we did have a very difficult visitor for the ME program. David Plummer, our IAB Chair, was present during a crucial portion of the visit, and we believe his interaction with this reviewer was very helpful in turning him around.

Response to the Charge to the IAB

The IAB's answers to our five numbered questions were very helpful to us, and we appreciate the confidence the Board expressed in our assessment methods, our interpretations of assessment results, our recommendations based on these interpretations, the adequacy of our Program Educational Objectives, and the adequacy and appropriateness of our Program Outcomes.

Conclusion

Once more, on behalf of our faculty and students, thank you for the excellent feedback you have given us. We value very much your continuing interest in our programs, and your willingness to lend your experience and wisdom to help us improve.

APPENDIX F

Mission Statement and Five Year Goals and Objectives

APPENDIX F
MISSION STATEMENT AND FIVE YEAR GOALS AND OBJECTIVES

SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING

1999-2004

The School of Mechanical and Aerospace Engineering (MAE) has a long history of establishing and achieving goals and objectives for its academic programs. These goals and objectives are focused on the traditional role of a land grant institution - teaching, research, and extension - interpreted in the broad context of a comprehensive, research university. The interconnections between the missions of the University and MAE are clearly embodied in the following documents in place in MAE.

1. Oklahoma State University - Mission Statement (draft)
2. School of Mechanical and Aerospace Engineering - Mission Statement
3. School of Mechanical and Aerospace Engineering - Goals and Objectives

1. OKLAHOMA STATE UNIVERSITY - MISSION STATEMENT

The Oklahoma State University is a modern comprehensive land grant university that serves the state, nation and international communities by providing its students with exceptional academic experiences, by conducting scholarly research and other creative activities that advance fundamental knowledge, and by disseminating knowledge to the people of Oklahoma and throughout the world. (January 1993 Draft)

2. SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING - MISSION STATEMENT

The School of Mechanical and Aerospace Engineering will support the mission of the Oklahoma State University by:

- providing the best possible education to students, grounded in engineering fundamentals, so that they are competitive in employment and advanced studies and are prepared for a lifetime of continuing development,

- engaging in basic and applied research, making significant, innovative contributions to the engineering and science base on which industrial competitiveness is built, to solve problems of both immediate and long-range concern to society, and to support our instructional programs,

- providing extension and public service activities where constituents' needs and School resources are compatible, and

- emphasizing the practice of engineering and the needs of the State of Oklahoma in each of the above activities.

3. SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING - GOALS

The goals of the School of Mechanical and Aerospace Engineering at Oklahoma State University are in keeping with the three mission charges of the land grant institution - instruction, research and public service.

GOALS FOR INSTRUCTION

The overall instructional goal of the School of Mechanical and Aerospace Engineering is to provide the best possible education to students of Oklahoma and other places such that they are competitive in employment, in advanced studies (both here and at other institutions) and are prepared for a life-time of self-study and continued improvement. Specific goals are:

Goal 1: To offer programs in Mechanical and Aerospace Engineering that achieve a level of quality eligible for full term accreditation and rank in the upper quartile of programs nationally.

Goal 2: Through effective long-range management of curriculum, faculty, and resources, both physical and fiscal, to achieve a vitality of instructional programs that exhibit high quality, and efficiency.

Goal 3: To actively recruit and retain faculty members of excellent quality by offering competitive compensation and benefits that include incentives for quality instruction as well as opportunities for professional development.

Goal 4: To actively recruit and retain outstanding students.

Goal 5: To provide instructional facilities, equipment, resources, and support services to both faculty and students that characterize an excellent learning environment.

Goal 6: To Promote interaction between state, local, and area industries and faculty.

PRIORITY OBJECTIVES FOR INSTRUCTION FOR THE NEXT FIVE YEARS

The following objectives address School issues relating to the preceding instructional goals. Their attainment will be shared responsibility among the School Head and MAE Faculty. Like other goals and objectives, they are subject to annual review and revision.

Instructional objectives related to each of the goals stated above are as follows:

Goal 1: To offer outstanding accredited programs in Mechanical and Aerospace Engineering

Objectives:

(1) Carefully review each year the quality of teaching in each course, and provide support, advice, and encouragement to each instructor to continually improve teaching performance.

(2) Review each year the criteria for accredited programs offered as published by ABET and other relevant national accrediting agencies, assuring that School programs exceed the minimum at each level for which accreditation is sought and maintained.

(3) Continue to offer courses and programs in MAE through the use of modern distance-learning technology. Encourage interaction with consortia and coalitions to facilitate broad marketing of the capability.

(4) Initiate and maintain high quality course offerings, faculty, and facilities to support B. S. and M. S. degree programs at OSU-Tulsa and the OU/OSU Graduate Research and Education Center in Tulsa.

Goal 2: To achieve a vitality of instructional programs

Objectives:

(1) Conduct an annual review to identify areas of emerging technology which may stimulate demand for new coursework and curricular options, or changes in existing courses and curricular options.

(2) Review the Engineering/Engineering Science courses annually to make certain that courses offered meet the needs of MAE students.

(3) Continue throughout to maintain those features of the Professional School concept and its admission criteria at the junior level that assure quality graduates.

Goal 3: To actively seek and retain faculty members of excellent quality.

Objectives:

(1) Special funding available to the School each year will be used to support faculty professional development. Faculty proposals for the funds, including instructional innovation projects, are encouraged. Outside funds will be actively sought to expand faculty development activities.

(2) Increase the tenure-track faculty in the School by at least 3 in the next 5 years, primarily to support education and research in Tulsa. Provide competitive salaries to aid recruiting, and develop innovative approaches to increasing women and minority role models among these positions.

(3) Encourage sabbatical leaves with a goal of one tenure-track faculty on leave each year. Flexibility in the type and direction of sabbatical leaves will be encouraged, and additional funding levels will be sought from the College to make such leaves feasible.

(4) Obtain funding for a total of 4 endowed faculty chairs in the School by 2005.

(5) Augment regular faculty with high-quality visiting faculty, recruited internationally, to enhance and expand instructional capability. Plan for at least one visitor per year.

Goal 4: To actively recruit and retain outstanding students.

Objectives:

(1) Continue to award MAE scholarships to supplement other funding for MAE freshman chosen for CEAT Scholars Programs and for other outstanding high school seniors enrolling in School programs.

(2) Establish endowments for 4 graduate student fellowships by 2005.

(3) Continue to support the OSU Research Scholars Program and the CEAT Scholars Program by faculty mentoring and high-quality research involvement.

(4) Increase the proportion of native-born graduate students in MAE programs and increase the quality of international graduate students.

(5) Expand efforts to recruit women and minority students into School programs.

Goal 5: To provide instructional facilities.

Objectives:

(1) Enhance the School plan for maintaining; upgrading, and modernizing laboratory equipment to assure annual expenditures at least 10% of maintenance level.

(2) Continue the integration and modernization of the School's computer resources, expanding the system, and implementing and updating software.

(3) Review strategy yearly for obtaining instructional equipment donations from industry.

(4) Take full advantage of the new Advanced Technology Research Center, both for educational as well as research purposes.

(5) Review yearly plans for utilization and management of classroom and laboratory space in the School and project long range space needs for instruction, including space for graduate teaching assistants.

Goal 6: To promote interaction between state, local, and area industries and faculty

Objectives:

(1) Seek to expand career opportunities for our graduate students, summer students, interns, and coop students.

(2) Develop contacts in industries who might serve as project sponsors, mentors, seminar speakers, and technical advisors.

(3) Develop avenues through which equipment and instrumentation might be borrowed on transferred to university use.

(4) Develop ties leading to opportunities for summer employment for faculty, for contracts for research and development, and for consulting. Promote industrial lab and computational facilities for university use.

(5) Recruit senior, mature graduate students from industry.

(6) Develop a market for high-technology short courses and other extension products.

GOALS FOR EXTENSION AND PUBLIC SERVICE

The School shall provide public service and extension activities for both general and specific education, where appropriate needs and school resources match, for the general public, the adult student and the traditional student. Our goal is to:

Goal 1: Provide public services, where appropriate, that are consistent with the mission of the University and the School's instructional and educational goals, and

Goal 2: Make available additional educational opportunities to the nontraditional and traditional students of Oklahoma and the nation.

GOALS FOR RESEARCH

The School shall engage in research activities, both fundamental and applied, in order to: (1) contribute to the understanding of the fundamentals of the world about us, (2) direct efforts toward solution of problems of both immediate and longer range concern for Oklahoma, the region, nation and world, and (3) support the instructional programs. Specifically we plan to:

- discover, examine and preserve the basic principles or laws that govern our environment,
- conduct research and development with mission-oriented objectives to help solve short range problems confronting Oklahoma, the region, nation, and world,
- relate our research activities to the School's instructional programs to ensure student participation and learning experiences, and
- maintain the competence and currency of the faculty in their professional fields.

Specific goals and objectives are:

Goal 1: Contribute to the fundamental and applied research knowledge base of the state, nation, and world.

Objectives:

(1) Increase level of publication of research results in peer-reviewed archival journals by every MAE tenure-track faculty member.

(2) Increase level of technical conference presentations by every MAE Faculty member.

(3) Support the writing and publishing by MAE faculty of at least two textbooks within the next 5 years.

(4) Increase our research proposal successes to provide annual extramural funding of $140K per tenure-track faculty member from federal, state, and industrial sources.

Goal 2: Emphasize the research mission of the University through research excellence in a selected set of priority areas.

Objectives:

(1) Focus on research areas for achieving excellence that have high impact and are relevant to faculty interests and expertise.

(2) Choose management strategies that will increase funds available for faculty development and equipment acquisition.

(3) Emphasize faculty development activities such as participation in relevant research meetings for the presentation of research results and interaction with professional colleagues.

(4) Allocate funds to areas that have the highest potential for achieving excellence and attracting funding on a sustained basis.

(5) Encourage and justify state funding in the budget for the next five years to support and develop faculty, facilities and equipment for research in priority areas by an appropriate mix of information/education.

Goal 3: Retain our best undergraduates for graduate school and internationally recruit for quality graduate students, post doctoral candidates, and visiting research faculty.

Objectives:

(1) Emphasize scholarship/fellowship opportunities of national laboratories and foundations.

(2) Establish a graduate student recruitment program by faculty visits, by the preparation of literature suitable for use at peer institutions, and by maintaining a high-quality, informative home page on the World Wide Web.

(3) Support and promote undergraduate research programs of the University and develop strategy to fund undergraduate research program.

(4) Emphasize MAE research thrust area through seminars, symposiums, and articles in student and public news media.

(5) Involve our own best undergraduates early in research programs.

(6) Increase the number of women and minorities in MAE graduate studies.

Goal 4: Promote interdisciplinary, group and university/industry collaborations.

Objectives:

(1) Continue to identify and support initiatives and trends that create interdisciplinary and group interests.

(2) Encourage interdisciplinary cooperation in the major thrust areas of (1) Integrated Design and Manufacturing, (2) Web Handling, (3) Fluid/Thermal Engineering Sciences, and (4) Dynamic Systems and Controls.

(3) Encourage industry/university consortia in emerging technology niche areas that have the potential for the development of research centers.

(4) Actively pursue spin-off to Oklahoma industry via licensing agreements of technology developed by School faculty.

Goal 5: Increase state/national awareness of MAE research program.

Objectives:

(1) Increase faculty interaction with key personnel in Federal Funding Agencies.

(2) Promote research seminars (explore the implementation of telecommunication as a means of delivery) and invite nationally recognized speakers.

(3) Publish a research report that may be used for public information and publicity that will feature personnel, facilities, technical publications, and programs.