OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004-2005

ACADEMIC PROGRAM REVIEW

OKLAHOMA STATE UNIVERSITY

INDUSTRIAL ENGINEERING AND MANAGEMENT

BSIE&M
MSIE&M
PHD

CONTENTS

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

INDUSTRIAL ENGINEERING AND MANAGEMENT -- 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)

BSIE&M
Formal degree abbreviation (Level I)

Degree-granting academic unit Industrial Engineering and Management
(Name) (Cost Center)

CIP code 143501

HEGIS code 0913

Instructional Program code 134

Name of department head William J. Kolarik
(person who oversees degree program listed above)

Program holds specialized accreditation from ABET

Name and title of contact person William J. Kolarik
(Name)
Professor and Head
(Title)

Date of Institutional Governing Board Review: March 1, 2005

President _____ Date: _____
(Signature)

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

INDUSTRIAL ENGINEERING AND MANAGEMENT -- 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)

MSIE&M
Formal degree abbreviation (Level I)

Degree-granting academic unit Industrial Engineering and Management
(Name) (Cost Center)

CIP code 143501

HEGIS code 0913

Instructional Program code 135

Name of department head William J. Kolarik
(person who oversees degree program listed above)

Program holds specialized accreditation from _____

Name and title of contact person William J. Kolarik
(Name)
Professor and Head
(Title)

Date of Institutional Governing Board Review: March 1, 2005

President _____ Date: _____
(Signature)

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

INDUSTRIAL ENGINEERING AND MANAGEMENT -- 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 Industrial Engineering and Management
(Name) (Cost Center)

CIP code 143501

HEGIS code 0913

Instructional Program code 136

Name of department head William J. Kolarik
(person who oversees degree program listed above)

Program holds specialized accreditation from _____

Name and title of contact person William J. Kolarik
(Name)
Professor and Head
(Title)

Date of Institutional Governing Board Review: March 1, 2005

President _____ Date: _____
(Signature)

ACADEMIC PROGRAM REVIEW – OKLAHOMA STATE UNIVERSITY – INDUSTRIAL ENGINEERING AND MANAGEMENT (BS, MS, AND PHD PROGRAMS)

EXECUTIVE SUMMARY

The Industrial Engineering and Management Program was founded in 1925 by a handful of dedicated faculty members and students. Today, it serves over 120 undergraduate students, over 100 graduate students, and over 200 interdisciplinary graduate students, with 13 dedicated faculty members. Our programs include baccalaureate, masters, and doctoral programs (http://www.okstate.edu/ceat/iem/). The Industrial Engineering and Management Program (IE&M) is guided by our vision, mission, and core values, and operates within a set of technical competencies which include (1) engineering management, (2) manufacturing systems, (3) operations research, (4) quality and reliability, (5) facilities, energy and environmental management, and (6) enterprise modeling and supply chains. The program has moved from a traditional educational approach to an outcome-based approach. An integrated process of objectives and outcome assessment is in place, subject to semi-annual and annual improvement cycles. Periodic programmatic redesign cycles are initiated on an "as needed" basis, where "as needed" is determined by IE&M constituents.

The outcome-based transformation was initiated in 1999 and is expected to continue into the future. The outcome-based approach, while not new to education in general, has been a learning experience for our faculty and staff. As we continue to learn, we will continue to improve and polish our approach and its integration, assessment, and development, with an expectation of improved program effectiveness and efficiency.

Our Program Review leadership is vested in the Head, who has completed ABET Examiner Training (2001, 2004), attended an ABET Assessment Workshop (2003), and served as a Malcolm Baldrige National Quality Award examiner in the education category (2000, 2001). The faculty as a whole addresses continuous improvement work, hence our organization is flat, our responses are rapid, and everyone is familiar with both our requirements and our responses thereto. The entire faculty devotes one full day to assessment and strategic and improvement planning in the fall term and one-half day is devoted to the same in the spring term. About 50% of each faculty meeting is devoted to matters that address planning, assessment, and improvement. Faculty meetings are held on a monthly basis. In addition, significant time is spent on individual and teamwork assignments between meetings.

The Industrial Advisory Board (IAB) of 12 industrialists serves (on site) to focus on programmatic planning, assessment, and improvement for one day in the fall term and one day in the spring term. Two Student Advisory Councils (six students each), one made up of undergraduate students and the other made up of graduate students, serves as the voice of the students. These groups typically meet with the Head three or four times per term, fall and spring. Additional student input is collected by instructors, the Undergraduate Program Director, and the Graduate Program Director (in addition to the Head) and used to better understand student perspectives.

Alumni and exit surveys are used to assess the level of attainment of program objectives. Direct inspection of work and exit and course outcome surveys are used to assess the level of attainment of course and program outcomes. Other informal channels of communication are used on an ad hoc basis to collect input and communicate with our constituents (students, alumni, employers, and faculty members).

Fundamentals of Engineering examination results typically fall above the national average and indicate that our current program is solid. Our students are competitive in national competition. For example, Katie Frye, a 2002 graduate, won the National IIE Student Paper Competition in 2002 with her (team) capstone design work, as presented in Orlando, Florida. Christina Lupher, a 2003 graduate, won the 2003 IIE Student Award for Excellence (first place in national competition, presented in Portland, Oregon). Over the last three years, more than 10 students have been successful in national-level scholarship competition. For example, in 2003, Jennifer Stafford, an IE&M junior, won the United Parcel Service Scholarship for Minority Students and was recognized for the same at the IIE National Conference in Portland, Oregon.

Our faculty continues to win numerous educational awards. For example, Dr. Allen Schuermann won the 2002 College Advising Award for his work in integrating personal attention and database technology within the advising process. Dr. Manju Kamath won the same award in 2004 for his work and mentorship of graduate students. Dr. David Pratt won the Regents Distinguished Teaching Award presented at the University level in 2004. Drs. Case,

DeYong, Kamath, Pratt, and Yauch, together, won over 15 teaching awards within the last three years. In addition, over one-third of our faculty members are Fellows within their respective professional societies.

We continue to introduce significant changes in our program, courses, and physical resources. Program and course foci have been expanded and sharpened in all areas. In 2001 we redesigned our graduate studies in terms of updating our courses and wrapping the program around our new faculty members (three new faculty members). A major undergraduate program redesign project, in collaboration with the Industrial Advisory Board, is in midstream. This redesign is in response to shifts in professional practice as well as internal program assessments. In general, improvements fall into three categories: (1) process, (2) program, and (3) course. The list below is a summary of major changes undertaken in IE&M as a result of program and course assessments:

Process-related improvements:

- The explicit naming and involvement of constituencies –
  - the reestablishment of the IAB.
  - the formation of the Student Advisory Councils.
- Development of vision, mission, core values, objectives, and outcome statements.
- The Alumni Survey and its alignment with program objectives statements.
- The Exit Survey and its alignment with program objectives and outcomes.
- Better student-faculty communications.

Program-related improvements:

- The redesign of the graduate program in terms of courses and specialty areas.
- The redesign of the undergraduate curriculum (under way).
- The redesign of the student advising system.
- The development of course portfolios, course outcomes, and formal instructor evaluations and the sharing of the information therein.
- Major upgrades of student laboratories.
- Upgraded presentation support with dedicated color printers for IE&M students.
- Restructuring of the course offerings prior to entry into senior projects (IEM 4913).
- Strengthening project management skills across the curriculum.
- More student-friendly IE&M Web site.

Course-related improvements:

- New graduate-level course offerings, clustered in specialty areas: (1) engineering management, (2) manufacturing systems, (3) operations research, (4) quality and reliability, (5) facilities, energy and environmental management, and (6) enterprise modeling and supply chains.
- Outcome-based course structures and performance surveys (and the improvement of our capabilities in writing course outcomes and assessing the same, related to program outcomes).
- Course topic mappings to program outcomes and objectives.
- Restructuring and coordination of IEM 4913.
- Coordination and action to make STAT 4033 more effective for IE&M students.
- Addition of a research methods course for undergraduates (IEM 4010).
- Better coordination of Web-based educational materials.
- Numerous course-level improvements.

Resources are traditionally tight, however, we have made significant upgrades to our facilities. We have upgraded our office area to accommodate student needs in specialized software and hardware access for project work and communications work. We have converted our primary classroom/lab to a multimedia presentation room. We have added full-scale CAD/CAM equipment to our manufacturing laboratory, as well as upgraded equipment in our work analysis and ergonomics laboratory. Hence, we are (and will be) better able to provide more hands-on opportunities to our students. Primary characteristics of our graduates are hands-on attitudes and abilities.

Karl N. Reid
Dean (signature)

3/4/05
Date:

OVERVIEW

A. Description of the Departmental/Program Review Process

The review process for our Industrial Engineering and Management (IE&M) programs (B.S., M.S., and Ph.D.) is based on the process that we use for our ABET (Accreditation Board for Engineering and Technology) accreditation. We have defined three primary constituencies: Students, Faculty, and Alumni and Employers. Our students are represented by our Undergraduate (student) Advisory Council and our Graduate (student) Advisory Council. Each group is made up of six students. We meet about one time per month and discuss issues dealing with School concerns, improvements, and programmatic re-design. The Alumni and Employers are represented by our Industrial Advisory Board. The Board is made up of 14 industrialists, some graduates from our program and some graduates from other programs. The faculty is represented by the entire faculty – as we do not use subcommittees to deal with issues as critical as program reviews and assessment. We use a combination of monthly faculty meetings and two work sessions per academic year for our faculty review and continuous improvement activities. One work session is a full day session (the Thursday after final grades are due for the fall term). The other work session is a half-day session (the Thursday after final grades are due for the spring term). All of the above activities are on-going at any one time, as opposed to a snapshot review process conducted on a periodic basis.

The continuous improvement process is driven by our vision, mission, and core values. These broad statements are broken down into program objectives (accomplishment is expected 2 to 5 years out from graduation), program outcomes (accomplishment is expected on graduation day), and course outcomes (accomplishment is expected at the end of each course). Indirect and direct assessments are used across the programs. Indirect assessment is accomplished by surveying our students and graduates. Alumni surveys are provided by University Assessments (undergraduate and graduate programs, every other year, respectively). Program outcomes are surveyed with exit surveys of our graduates. Course outcomes are surveyed by end-of term teaching and course outcome assessments.

Direct assessments include results reported to us with state and national performance comparisons on the Fundamentals of Engineering Exam, results from our capstone design course, results from our thesis and dissertation proposals and defenses, results from student advising, and examination and collection of graded/scored work accomplished by our students in their courses, as per our program and course outcomes. In addition, the performance of our teaching assistants and associates is reviewed by their mentor and the Head, and reported to our Deans. Course and program outcome results are archived and available for examination by all faculty members and the Industrial Advisory Board. Teaching evaluations are reviewed by the Head and discussed/delivered to each faculty member. The above assessments are used to help guide program improvements across all levels – from course content and delivery to program structures.

B. Recommendations from Previous Program Reviews

No previous program review recommendations were encountered.

CRITERION I
Program Centrality

A. Goals and Objectives of Degree Programs

The IE&M programs are driven from a common purpose, including a vision, mission, core values, and objectives. Specific program outcomes have been developed and expressed for the baccalaureate and the masters and doctoral programs. Furthermore, each course is defined by a set of course outcomes expected. The course outcomes are numerous and not reprinted in this section. Course outcomes are stored in the course portfolios and available in the IE&M Office.

Vision

The School of Industrial Engineering and Management will be internationally recognized by industry and academia for excellence in education, research, extension, and service.

Mission

The School of Industrial Engineering and Management discovers, verifies, integrates, and transfers knowledge and methodologies relating to enterprise design and management, information technology, and modeling and optimization.

Core Values

Excellence – We seek excellence in all our endeavors, and we are committed to continuous improvement.
Integrity – We are committed to the principles of truth and honesty, and we will be equitable, ethical, and professional.
Service – We believe that serving others is a noble and worthy endeavor.
Intellectual Freedom – We believe in ethical and scholarly questioning in an environment that respects the rights of all to freely pursue knowledge.
Diversity – We respect others and value diversity of opinion, freedom of expression, and other ethnic and cultural backgrounds.
Stewardship of Resources – We are dedicated to the efficient and effective use of resources. We accept the responsibility of the public's trust and are accountable for our actions.

Educational Objectives

The educational program emphasizes the application of technologies and tools in the short term, and the ability to discover, acquire, and adapt new knowledge and skills in the long term, such that our graduates are prepared:

i. To define, analyze, and solve complex problems within and between enterprises.
ii. To discover, understand, and incorporate appropriate new technologies in the design and operation of enterprises.
iii. To lead/manage design, development, and improvement efforts that benefit customers, employees, and stakeholders.
iv. To function in culturally diverse teams, communicate in a professional manner, and uphold the ethical standards of the engineering profession.

IE&M Baccalaureate Educational Outcomes

Graduating baccalaureate students possess an understanding of fundamental industrial engineering and management concepts, methodologies, and technologies as demonstrated by:

a. An ability to apply knowledge of mathematics, probability and statistics, science, engineering, and engineering economy.
b. An ability to design and conduct experiments involving risk and uncertainty, as well as to analyze and interpret data.
c. An ability to design a system, component, or process to meet desired needs.
d. An ability to function on culturally diverse, multi-disciplinary teams.
e. An ability to identify, formulate, and solve engineering problems involving physical, human, and economic parameters.
f. An understanding of professional and ethical responsibility.
g. An ability to communicate effectively.
h. The broad education necessary to understand the impact of engineering solutions in a global and societal context.
i. A recognition of the need for, and an ability to engage in life-long learning.
j. A knowledge of contemporary issues and the role of the human in enterprise activities.
k. An ability to use the techniques, skills, and modern engineering tools necessary for industrial engineering and management practice.

IE&M Graduate Educational Outcomes

Graduating masters degree students will demonstrate:

Depth

a. Understanding of advanced concepts, methods, and technologies in an IE&M thrust area: (1) engineering management, (2) manufacturing systems, (3) operations research, (4) quality and reliability, (5) facilities, energy and environmental management, and (6) enterprise modeling and supply chains.

Breadth

b. Understanding of IE&M beyond a specific thrust area.

c. Understanding the role of industrial engineering, management, and leadership in business and society.

Comprehensive Thinking Skills

d. Ability to identify, formulate, and creatively solve unstructured problems.

e. Ability to think at all six levels of Bloom's taxonomy (knowledge, comprehension, application, analysis, synthesis, and evaluation).

Fundamentals

f. Knowledge and skills required to apply fundamental IE concepts, methods, and technologies.

g. Sufficient knowledge and skills in math, basic science, and engineering science to successfully perform in their thrust area.

h. Understanding of professional and ethical responsibilities.

i. Ability to perform in culturally diverse, multi-disciplinary teams.

Communication

j. Ability to effectively communicate problem definitions, analysis, potential solutions, results, and recommendations to both technical and general audiences.

Thesis Option – In addition to the above, graduating students possess:

k. An understanding of research methodologies in terms of planning and executing a creative research program and communicating the results therefrom.

Doctoral Level – In addition to the above, graduating students possess:

l. A mastery of research methodologies in terms of planning and executing a creative research program and communicating the results therefrom.

B. Linkage of the Program to Institution's Mission

IE&M's purposes, as expressed in Section A, are compatible with and support the OSU purposes as well as purposes expressed by the College of Engineering, Architecture, and Technology (CEAT).

OSU Vision

Oklahoma State University – Stillwater will become one of the premier public universities in the United States and lead in the creation of a new Oklahoma.

OSU Mission

Proud of its land grant heritage, Oklahoma State University – Stillwater advances knowledge, enriches lives, and stimulates economic development through instruction, research, outreach, and creative activities.

CEAT Vision

The college of Engineering, Architecture, and Technology will have a priority on excellence as evidenced by:

- Responsive academic programs which are competitive with the best and accessible to students who reflect the diverse fabric of the State and Nation;
- Nationally-recognized research programs in areas of strategic importance to the State and the Nation;
- Distance and continuing education programs that meet the needs of practicing engineers, architects, and technologists throughout Oklahoma and the Nation; and
- Knowledge-based programs developed through active partnerships with industry and government that address the Nation's most pressing technological problems.

CEAT Mission

The College of Engineering, Architecture and Technology provides students with exceptional academic experiences, conducts scholarly research and other creative activities that advance fundamental knowledge and contributes to technology development, and disseminates knowledge to the people of Oklahoma and throughout the world.

CRITERION II
Program Curriculum and Structure

A. Program Structure

The program structure for the baccalaureate degree is shown in Figure II.1. The program structures for the masters and doctoral degrees conform to requirements expressed and published by the Graduate College. These programs consist of a 30-hour masters thesis program, a 33-hour masters non-thesis program, and a 66-hour doctoral program (on top of a masters program). The guide sheet for the masters program is shown in Figure II.2. Doctoral plans of study are custom designed with each student and meet the general requirements set by the Graduate College.

B. Distance Education

IE&M offers a number of undergraduate and graduate-level courses via distance education. These courses typically support masters distance students working on MSIE&M degrees, MSETM (Masters of Science in Engineering and Technology Management), the HCA Program (Health Care Administration), and the National Technological University. A list of distance courses offered within the last two years includes:

IEM 4103 (Industrial Quality Control)
IEM 4113 (Industrial Experimentation)
IEM 5103 (Breakthrough Quality)
IEM 5113 (Strategic Quality Leadership)
IEM 5123 (Service Quality)
IEM 5153 (Process Design and Integration)
IEM 5303 (Computer Integrated Manufacturing Systems Design for Higher Volume Products)
IEM 5363 (Management of Cellular Manufacturing Systems)
IEM 5413 (Managing the Engineering and Technical Function)
IEM 5503 (Financial and Advanced Capital Investment Analysis)
IEM 5603 (Project Management)
IEM 5613 (Integrated Manufacturing Control Systems)
IEM 5623 (Project Planning and Control Technologies)
IEM 5743 (Information Systems and Technology)
IEM 5763 (Supply Chain Strategy)
IEM 5813 (Performance Measurement Systems)
IEM 5823 (Performance Management and Improvement)
IEM 5943 (Hazardous Material and Waste)

In addition to the above listing, special topics courses are made available to distance students. These courses are taught under an IEM 5010 or IEM 5990 number. Typically distance courses will contain both on-campus and off-campus (distance) students in the same "classroom." The CEAT Distance Education arm manages the logistics for distance students.

C. Articulation Agreement

IE&M maintains no articulation agreements, but honors those entered into by our College and University.

D. Multidisciplinary Programs

A number of IE&M faculty participate in interdisciplinary degree programs, namely the Master of Science in Engineering Technology and Management Program and the Health Care Administration Program. Limited participation in the National Technological University Program is also provided by IE&M. The courses listed in section B are taught by IE&M faculty and serve the multidisciplinary programs. IE&M faculty also serves the Tulsa Program by offering several courses to Tulsa students either by distance or by on-site delivery (in Tulsa).

OKLAHOMA STATE UNIVERSITY

GENERAL REQUIREMENTS — COLLEGE OF ENGINEERING, ARCHITECTURE AND TECHNOLOGY

For students matriculating:

Academic Year ..... 2004-05 — BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING AND MANAGEMENT (DEGREE)

Total hours ..... 134 — INDUSTRIAL ENGINEERING AND MANAGEMENT (MAJOR)

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 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)	10	MATH 2144, 2153, 2163,
Humanities (H)	3	Any course designated (H) at Oklahoma State University.
Natural Sciences (N)	8	CHEM 1414, PHYS 2014
Social and Behavioral Sciences (S)	6	SPCH 2713 and Any course designed (S) at Oklahoma State University. Consult the college and departmental requirements.
International Dimension (I)	-	Any course designated (I) at Oklahoma State University. Students are encouraged to meet the requirement in their selection of (H) or (S) course work.
Scientific Investigation (L)	-	Any course designated (L) at Oklahoma State University. Normally met by Natural Science and/or Basic Science requirements.

College/Departmental Requirements
Pre-Engineering 21 Hours

Basic Science	4	PHYS 2114
Engineering	5	ENGR 1111, 1322, 1412
Engineering Science	12	ENSC 2113, 2123, 2143, 2213
Humanities and Social Sciences	-	The total (H) & (S) program must satisfy ABET Accreditation criteria. Consult the college and departmental requirements.

Major Requirements 74 Hours

COMMON PROFESSIONAL SCHOOL 18 HOURS

Mathematics	6	MATH 3263, STAT 4033
Engineering Science	6	ENSC 2613 or 3233, 3313
Basic Science	3	Select from: BIOL 1114, CHEM 1515; FOR 3213; GEOG 1114, GEOL 1114 PHYS 3313, ZOOL 3123, 3204
Humanities (To complete Gen. Ed. requirements)	3	A course designated (H) at Oklahoma State University. Consult the college and departmental requirements.

Specific Professional School Requirements 53 Hours

Admitted to the Professional School of Industrial Engineering and Management. (See Professional School Admission Requirements.)

IEM 2903	3813	4613
3303	4014	4713
3313	4103	4723
3503	4113	4823
3523	4203	4913
3703	4413	4931

Controlled Elective 3 Hours

A 3000- or 4000-level CS, Engineering, MATH or STAT course selected in consultation with an adviser. (Required courses in the IEM curriculum are excluded.)

Other Requirements: A 2.00 GPA is required in all course work listed in the right hand column above.
The major engineering design experience is satisfied by IEM 4913.
A "C" or better is required in each course that is a prerequisite for an IEM course, and in technical courses in Pre-Engineering whether taken prior to admission to Professional School or not.
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.

Kaye M. Reed
DEAN

DEPARTMENT HEAD

EN-14

Figure II.1 baccalaureate degree requirements sheet.

Figure II.2 degree requirements planning sheet for masters degree.

SCHOOL OF INDUSTRIAL ENGINEERING AND MANAGEMENT

MS DEGREE PROGRAM -- Options and Specialty Areas

2004-05

Name: _____

Program Option: _____ Specialty: _____

Program options (hours)*	THESIS	CC-IS	CC-CW
Research (IEM 5000)	6	0	0
Indep. study (IEM 5350)	0	3**	0
Core group courses	at least 9	at least 9	at least 9
Core plus supporting group courses	at least 15	at least 18	at least 21
Electives***	balance	balance	balance
TOTAL	30 hours	33 hours	33 hours

2004-05

*At least 21credit hours must be completed in IEM 5000 level (or higher) courses including thesis/independent study hours.

**Under the CC-IS option the topic pursued in the independent study course must be related to the specialty area.

***Electives must be approved by the faculty advisor.

A grade of B or better must be earned in at least three courses taken from the core courses.

SPECIALTY	ENGINEERING MANAGEMENT	MANUFACTURING SYSTEMS	OPERATIONS RESEARCH	QUALITY & RELIABILITY	FACILITIES, ENERGY & ENV. MANAGEMENT	ENTERPRISE MODELING & SUPPLY CHAINS
CORE COURSES	5113	5303	5013	5103	5010 (4923)	5153
	5413	5313	5023	5113	5203	5703
	5503	5363	5033	5123	5503	5723
	5603	5603	5043	5133	5623	5743
	5623	5613	5133	5143	5923	5753
	5743	5633	5703	5153	5943	5763
	5813	5703		5823	MAE 4703 (Indoor Env. Sys.)	5773
	5823	MAE 4323 (DFM)				MSIS 5123 (ERP)
SUPPORTING COURSES	5103	5013	5103	5303	5113	5013
	5123	5023	5143	5313	5143	5103
	5153	5113	5203	5363	5153	5113
	5203	5133	5503	5503	5303	5123
	5363	5203	5633	5603	5313	5133
	5613	5413	5713	5613	5363	5303
	5633	5503	5723	5623	5413	5313
	5723	5713	5753	5703	5603	5503
	5753	5723	5773	5713	5613	5603
	5763	5743	6123	5723	5703	5613
	5773	5753	5990 (Spl. Topics)	5743	5743	5623
	5803	5763	6990 (Adv. Topics)	5753	5753	5633
	5990 (Spl. Topics)	5813	STAT 4043 (Regr.)	5763	5763	5713
	6990 (Adv. Topics)	5943	STAT 5053 (Time Series)	5803	5803	5813
	MGMT 5223 (HR Mgmt.)	5990 (Spl. Topics)	STAT 5303 (Exp. Design)	5813	5813	6123
	MBA 5303 (Corp. Strategy)	6990 (Adv. Topics)	MATH 5523 (Calc. Var.)	5990 (Spl. Topics)	5823	5990 (Spl. Topics)
	MKTG 5133 (Mktg. Mgmt.)	MBA 5303 (Corp. Strat.)	MATH 5553 (Num. Anal)	6990 (Adv. Topics)	5990 (Spl. Topics)	6990 (Adv. Topics)
	MKTG 5813 (Channels of dist.)	MAE 6123 (Non-Trad. Mach.)	CS 5513 (Num. Anal. I)	STAT 4043 (Regr.)	6990 (Adv. Topics)	CS 4283 (Networks)
			AGEC 5113 (Math. Prog.)	STAT 4091 (SAS)	MAE 5873 (Adv. Indoor Sys.)	CS 4343 (Data Struct.)
			AGEC 5403 (Prod. Econ.)	STAT 5033 (Non. Par.)	ECEN 5153 (Energy Conv.)	CS 5070 (OOP)
			AGEC 6103 (Adv. Math Prog.)	STAT 5043 (Survey Des.)	ECEN 5193 (Power Econ.)	CS 5423 (Prin. Database Sys)
				STAT 5053 (Time Ser.)	ARCH 5133 (Adv. Energy)	MSIS 5133 (Adv. Info. Tech.
				STAT 5063 (Multivar.)	ARCH 5233 (Adv. Lighting)	for E-commerce)
				STAT 5313 (Bayesian)		MSIS 5623 (Adv. MIS)
				STAT 5303 (Exp. Des.)		MSIS 5633 (DSS & ES)
				STAT 5403 (Sample Des.)		MSIS 5643 (Adv. DBMS)
FACULTY	Case, DeYong, Mandeville, Rossler, Yauch	Bukkapatnam, Kamath, Nazemetz, Pratt, Rossler, Yauch	Branson, Ingalls, Kamath, Oliveira	Bukkapatnam, Branson, Case, DeYong, Kolarik	Kolarik, Pratt, Turner	Bukkapatnam, Ingalls, Kamath, Nazemetz, Oliveira, Pratt

5013	Lin. Mod.
5023	Optimization Applications
5033	Lin. Opt.
5043	Nonlin. Opt.
5103	Breakthrough Qual.
5113	Strat. Qual. Leadership
5123	Service Qual.
5133	Stochastic Proc.
5143	Rel. & Maintainability
5153	Proc. Design & Integ.
5203	Ad. Fac. Loc./Layout
5303	CIM High Vol.
5313	CIM Low Vol.
5363	Mgmt. Of Cellular Mfg. Sys.
5413	Managing Engr. & Tech. Fn.
5503	Fin. & Adv. Cap. Inv. Anal.
5603	Project Mgmt.
5613	Integ. Mfg. Control Sys.
5623	Proj. Plan. and Cont. Tech.
5633	Adv. Prod. Control
5703	Dis. Sys. Simulation
5713	Stat Topics in Sim. Mod.
5723	Data, Proc., and Obj. Mod.
5743	Info. Sys. and Tech.
5753	Mfg. Enterprise Modeling
5763	Supply Chain Strategy
5773	Supply Chain Modeling
5803	Human Factors
5813	Perf. Meas. Sys.
5823	Perf. Mgt. and Improv.
5923	Adv. Energy & Waste Mgt.
5943	Haz. Mat. and Waste Mgmt.
5990	Special Topics in IE&M
6123	Queueing Sys.
6990	Advanced Topics in IE&M

Note: In general, thesis or CC-IS students would be advised by a faculty member listed in their chosen specialty area. CC-CW students may choose any IE&M faculty member as their adviser.

CRITERION III
Program Resources

A. New Facilities and Major Equipment

Each faculty member in IE&M has a private office suitable for class preparation, student counseling, and the execution of other faculty duties. Each office is equipped with a private telephone, Internet access, and at least one computer. Faculty members use private and/or shared printers and all have free access to a digital copy machine. All office areas are secure and located within the IE&M office complex in Engineering North. IE&M attempts to keep faculty computers and software current through periodic replacement and need-based acquisition of special equipment and software.

The reception area of the main IE&M office now has two computers and color printers (updated in the last two years) available for student use (in addition to the computers in the college and university computer laboratories). These computers are used primarily for preparing and printing project reports and e-mail. The office maintains a report-binding machine available for student, staff, and faculty reports.

EN 316 and EN 315 serve as a classroom/laboratory facility unique to IE&M. EN 315 has a full set of support equipment to support the laboratories in IEM 3813 (Work Performance: Analysis and Design) and IEM 4823 (Industrial Ergonomics). Equipment upgrades for these laboratories were completed within the last two years. About $15,000 in additional equipment was added to the work analysis and ergonomic labs in EN 315. Basic equipment purchases included both hardware and software devoted exclusively to these laboratories.

EN 316 is used as a classroom and as a laboratory room. It has been re-designed and retrofitted as a multimedia classroom/lab (within the last five years) in order to meet the specific needs of IE&M. It contains a computer-driven multi-media system consisting of a 2,500 lumen projector, DVD, video, document projector, overhead projector, and surround sound audio system. IE&M also owns two other computer driven projectors, which are used by faculty members teaching in standard university classrooms.

The Design and Manufacturing Laboratory (DML) is a shared college facility that serves IE&M, Mechanical and Aerospace Engineering, and Engineering Technology. The DML facility houses machine shop capabilities used to support IEM 3303 (Industrial Processes I) and IEM 3313 (Industrial Processes II). It contains design and manufacturing laboratories. In Fall 2003 it was upgraded and now houses 16 computers equipped with CAD/CAM software, supported and maintained by the CEAT Computer Group. These computers are available to IE&M, MAE, and Engineering Technology students. A machine shop with capabilities in CNC is housed in the DML. This laboratory has conventional and computer controlled metal cutting (vertical mill and lathe) capabilities to support IE&M's hands-on approach to education. IE&M also utilizes the Biosystems Engineering welding shop facility to provide hands-on experience with several types of welding processes. The DML (specifically the teaching laboratory part of the DML) houses a Haas Technical Center, which contains a full-scale Haas 4-axis milling center and a full-scale CNC Haas turning center. The CAD/CAM software is used as an interface for the machines. In addition, two full-scale Haas machine simulators are housed in the teaching laboratory (one for the mill and one for the lathe). This equipment was installed in the summer of 2003.

This significant upgrade to our manufacturing laboratory has been a result of an intensive three year cooperative effort between IE&M and Engineering Technology. Both programs determined a need to upgrade their laboratory instruction programs due to limitations in past laboratory equipment with respect to student hands-on opportunities. In other words, based on input from our constituents and examination of programs at peer institutions, it was clear that our opportunities were dated and limited.

IE&M and Engineering Technology have pooled and leveraged their resources to upgrade manufacturing lab facilities. In total, the teaching lab contains about $250,000 in new equipment (hardware, software, and facilities improvement). The roots of this effort trace back to recognized limitations in the old laboratory. The University Master Lease Program was used to respond to this need, along with CEAT support for the CAD/CAM computers and software. IE&M put up $40,000 while Engineering Technology put up $20,000 in hard dollars. Haas agreed to entrust a CNC lathe of equal or lesser value (than the 4-axis mill). Tooling was donated. CEAT support makes up the balance.

B. Academic and Administrative Efficiencies

IE&M administration is accomplished with "part-time" administrators (as opposed to full-time administrators). The Head, Undergraduate Program Director, and the Graduate Program Director all teach heavy loads (roughly two courses per semester each) in addition to their administrative duties and active involvement in funded research and scholarly endeavors. IE&M currently operates with a staff of three secretaries/administrative assistants and a work study student.

C. External Funding

The faculty of IE&M is actively engaged in funded research. Typically, over two-thirds of the faculty members are actively engaged in extramural research activity. Our goal is to produce about $1 million per year in extramural research. This level of activity stretches our teaching base, but allows us to engage many of our graduate students in research activities. Details as to specific research projects are available in Appendix A.

IE&M Report Card statistics provided by OSU Institutional Research are shown in Section IV, Subsection A, Table IV.3. Please refer to the last line in the Report Card, Table IV.3. Research goals are generally met, as new faculty members are expected to build research programs and involve students as a part of reappointment, tenure, and promotion requirements. Current research expenditures, from Table IV.3, are running at around $1 million per year.

CRITERION IV
Productivity

A. Number of Majors (headcount), Student Credit Hours, and Average Time to Graduation

Official figures as to headcounts depend on how interdisciplinary program students are counted. For example, IE&M faculty members work with and advise a number of interdisciplinary students in the MSETM and HCA programs, in addition to our IE&M students. The same holds true for student credit hour counting. The statistics below are produced by OSU Intuitional Research and reflect graduate student counts which include the multidisciplinary programs managed by IE&M faculty members. Figures as to enrollment and graduation are provided in Table IV.1, Table IV.2, and Table IV.3.

Our student populations at both the undergraduate and graduate levels tend to vary from year to year. During the past five years, the student populations, with the exception of the doctoral program, trended upward beyond the capacity of IE&M resources. For example, we experienced about a 50% increase in the size of our MS program in Fall 2002 and Fall 2003. These increases coupled with strong spring term enrollments stretched our resources. Since this time, we have been working to "right size" the MSIE&M program. Likewise, the program managers of the MSETM and HCA programs have experienced significant growth. Both managers are members of the IE&M faculty.

The average time to graduation is typical for our program requirements and has tended to be steady over time. Efforts are underway to reduce the program hours in the undergraduate program by about six credit hours. This reduction is expected to have minimal impact on the overall graduation rate, as many students are focusing on smaller academic loads, with added emphasis on grades, outside activities, and summer internships. This student strategy tends to emphasis enhanced employment prospects after graduation, as opposed to rapid movement through the program. Our Industrial Advisory Board has weighed in on this concept and has recommended that we focus on our quality perspective and consider the length of program and time in program as secondary issues. The Board's perspective appears to be reasonable, considering they represent both alumni and employers.

Table IV.1 IE&M enrollment statistics (provided by OSU Institutional Research).

OSRHE PROGRAM REVIEW
CRITERION IV - PROGRAM PRODUCTIVITY
NUMBER OF MAJORS IN EACH PROGRAM FOR PAST FIVE FALL SEMESTERS

DEPARTMENT_NAME=INDUSTRIAL ENGR & MGMT

	FALL				
	FALL 2000	FALL 2001	FALL 2002	FALL 2003	FALL 2004
PROGRAM	N	N	N	N	N
Industrial Engineering & Management - BS	134	138	150	137	130
Industrial Engineering & Management - MS	44	93	101	113	92
Industrial Engineering & Management - PHD	13	11	21	22	21

Table IV.2 IE&M graduation statistics (provided by OSU Institutional Research).

OSHRE PROGRAM REVIEW
CRITERION IV - PROGRAM PRODUCTIVITY
FIVE YEAR HISTORY OF DEGREES AWARDED

-------- COLLEGE=ENGIN, ARCH & TECH, DEPARTMENT=INDUSTRIAL ENGR & MGMT --------

		YEAR				
		1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
		N	N	N	N	N
PROGRAM	TERM					
Industrial Engineering & Management - BS	SUMMER	3	3	7	5	
	FALL	6	5	4	9	9
	SPRING	20	27	31	18	19
	All	29	35	42	32	28
Industrial Engineering & Management - MS	TERM					
	SUMMER	4	3	3	9	21
	FALL	7	8	6	14	14
	SPRING	17	10	10	17	16
	All	28	21	19	40	51
Industrial Engineering & Management - PHD	TERM					
	SUMMER				1	
	FALL				1	1
	SPRING		1		1	1
	All		1		3	2

Table IV.3 IE&M Report Card (provided by OSU Institutional Research).

Oklahoma State University
FIVE-YEAR ACADEMIC REPORT CARD
INDUSTRIAL ENGR

Fall Semester	2000	2001	2002	2003	2004	Change Amount	Change Percent
Student Information							
Headcount	134	138	150	137	130	-4	-3.0%
Undergraduate	236	284	310	298	373	137	58.1%
Graduate	0	0	0	0	0	0	-
Professional	370	422	460	435	503	133	35.9%
Total	116	164	185	178	190	74	63.8%
Minority	254	258	275	257	313	59	23.2%
Non-minority							
Entry Information							
ACT Average	26.33	27.72	26.68	25.94	28.25	1.92	7.3%
ACT 25th - 75th Percentile	22-29	26-31	24-29	24-29	26-30		
Top 10% High Sch. Class(%)	38.9%	48.0%	52.6%	41.2%	40.0%	1.1%	
Retention/Graduation Rates							
No. of Full-time Semesters	0	9.7	9.3	9.8	9.5	-0.2	-2.1%
Semester Credit Hours - State Funded	1,992	1,763	1,862	1,980	1,872	-120	-6.0%
Undergraduate	586	1,078	1,027	997	798	212	36.2%
Graduate	0	0	0	0	0	0	-
Professional	2,578	2,841	2,889	2,977	2,670	92	3.6%
Total							

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	18	43.6	18	34.7	17	39.7	18	41.1	17	41.1	-1	-5.6%
Graduate/Professional	18	9.0	20	11.0	25	12.0	25	12.0	15	21.0	-3	-16.7%
All Student	36	26.3	38	22.2	42	23.2	43	24.2	32	31.7	-4	-11.1%

Class Size						
% of Classes < 20	55.6%	57.9%	59.5%	55.8%	50.0%	-5.6%
% of Classes > 50	5.6%	7.9%	9.5%	9.3%	25.0%	19.4%
OSU-Tulsa						
Headcount	48	49	66	42	42	-6 / -12.5%
Student Credit Hours	222	345	393	257	276	54 / 24.3%
Faculty Information						
Instructional-FTE	10.79	10.46	9.70	10.76	12.19	1.40 / 13.0%
Professor-Lecturer	7.38	6.88	4.50	8.50	7.63	0.25 / 3.4%
Graduate Assistant	18.17	17.34	14.20	19.26	19.82	1.65 / 9.1%
Total						
Headcount						
Professor-Lecturer	15	14	14	14	16	1 / 6.7%
Total	2	2	2	2	4	2 / 100.0%
Minority	13	13	13	13	14	1 / 7.7%
Tenured/Tenure Track	10	10	11	11	11	1 / 10.0%
Tenured	76.9%	76.9%	84.6%	84.6%	78.6%	1.6%
%Tenured						
% of Faculty Full - Time	97.5%	94.7%	97.5%	97.5%	95.5%	-2.0% / 100.0%
Student Faculty Ratio	18.2	23.1	24.4	23.3	21.3	3.1 / 16.8%

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	$92,793	$93,258	$95,846	$97,041	$95,846	$97,198	$91,701	$100,068	$101,482		$8,689	9.4%
Associate	$67,898	$68,700	$70,277	$72,613	$70,345	$73,442	$71,504	$74,913	$74,218		$6,320	9.3%
Assistant	$59,400	$59,640	$61,560	$63,109	$60,975	$64,101	$60,975	$64,902	$63,833		$4,433	7.5%

Classes Taught by Tenured/Tenure Track						
% Lower Div. Classes	100%	100%	100%	100%	100%	0.00%
% Undergrad. Classes	100%	100%	100%	83%	94%	-6.00%

Oklahoma State University
FIVE-YEAR ACADEMIC REPORT CARD
INDUSTRIAL ENGR

Fiscal Year	2000	2001	2002	2003	2004	Change Amount	Change Percent
Financial Information							
Faculty Salaries	$879,577	$1,053,203	$1,083,744	$1,048,286	$759,226	($120,351)	-13.7%
Other Salaries	$90,375	$109,639	$106,757	$109,263	$92,293	$1,918	2.1%
Fringe Benefits	$187,395	$275,864	$308,742	$301,611	$224,232	$36,837	19.7%
Travel	$17,986	$10,633	$11,235	$22,717	$16,878	($1,108)	-6.2%
Utilities	$0	$0	$0	$0	$0	$0	-
Supplies Other Oper. Exp.	$61,223	$75,356	$59,769	$50,187	$37,908	($23,315)	-38.1%
Property, Furniture Equip.	$14,732	$16,432	$15,762	$32,777	$11,494	($3,238)	-22.0%
Library Books Periodicals	$227	$457	$341	$35	$0	($227)	-100.0%
Transfers Other Disbur.	$0	$0	$0	$0	$0	$0	-
Total	$1,251,515	$1,541,585	$1,586,349	$1,564,876	$1,142,031	($109,484)	-8.7%
Cost per SCH	$268.34	$288.69	$271.08	$258.87	$190.85	($77.49)	-28.9%
Cost per SCH in Constant $	$268.34	$280.47	$258.99	$241.19	$172.34	($96.00)	-35.8%
Other Revenue							
Other Student Fees	$5,190	$6,000	$4,600	$4,790	$4,100	($1,090)	-21.0%
Gifts and Grants	$0	$14,668	$81,201	$20,650	$115,566	$115,566	-
OSU-Tulsa Fac. Exp. Transfers	$0	$63,800	$187	$72,763	$82,255	$82,255	-
Fees Related to Educ. Depts.	($50)	$0	$207	$0	$0	$50	-100.0%
Other Income	$75,768	$87,298	$135,793	$149,334	$51,017	($24,751)	-32.7%
Total	$80,908	$191,766	$221,988	$247,537	$252,938	$172,030	212.6%
nal Funding							
Sponsored Expenditures**	$434,477	$433,461	$544,654	$1,118,818	$1,080,928	$646,451	148.8%

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

B. Faculty Ratio and Class Size

The class size statistics and faculty ratios pertaining to IE&M are listed in Section A, Table IV.3. These statistics were furnished by OSU Institutional Research. Although not totally apparent in the statistics, we have been working to control the sizes of several of our graduate classes.

In addition to the usual fluctuations in class size from term to term, we have several graduate course sections that have received attention due to over-the-top enrollments, namely IEM 5113, 5503, and 5613. We decided to allow over-enrollment (with instructor approval) in fall 2003, but have attempted to limit these same enrollments in fall 2004. For example, a graduate class in an engineering discipline should be closer to 20 to 30 students than 50 to 80 students. These high numbers were a combination of an influx of more MS students than we expected in 2002 and 2003 in our programs and in the MSETM program (off-campus) which we serve. We currently enjoy a good reputation in our programs; our basic strategy is to hold the reputation. To hold this reputation we think that we will have to control enrollments in our courses going forward.

It is likely that hours will drop off more in the future, as the Graduate College seems to be encouraging a waver policy whereby international graduate students are allowed to under-enroll (less than full-time enrollment) in their last semester and national and international students holding a quarter or half-time appointment as a TA or RA are allowed to do the same. This under-enrollment is expected to have a sizable impact, as full-time MS students typically stay for 3 or 4 semesters. An additional factor is that we allow our students to include several non-IE&M courses in their plans of study. We have used this latter strategy to provide students more choice in their plans of study and to take some enrollment pressure off of IE&M courses.

C. 5-Year Average Number of Degrees Conferred and Majors

Enrollment and graduation statistics for the past five years are listed below. All IE&M enrollment statistics are well above the Oklahoma State Regents for Higher Education (OSRHE) minimum productivity standards. IE&M has maintained an average of 137.8 undergraduates, 88.6 masters (on campus), and 17.6 doctoral students in its programs. The OSRHE minimum requirements are 12.5, 6, and 4.5, respectively.

IE&M graduation statistics exceed OSRHE minimum requirements, with the exception of the doctoral program. IE&M has maintained an average of 33.2 baccalaureate graduates, 31.8 masters graduates, and 1.2 doctoral graduates. The OSRHE minimum requirements are 5, 3, and 2, respectively. Deviations and improvement plans for the doctoral program are described below:

> The School of Industrial Engineering and Management has a rich history of producing outstanding scholars and practitioners from its graduate programs. IE&M graduates populate well known faculties across the United States.
>
> Events several years ago created a situation that unfortunately impacted the output of the IE&M doctoral program. First, faculty interest was shifted to masters programs, including interdisciplinary programs such as the MSETM (Master of Science in Engineering and Technology Management) and HCA (Health Care Administration). While these programs prospered and attracted over 300 students (combined), School resources and focus tended to be limited with respect to doctoral studies. At the same time, economic opportunities beyond the walls of the campus encouraged a number of our doctoral students and prospective doctoral students to take employment and delay their doctoral studies and/or abandon them in the face of high-dollar opportunities in professional practice. The net results were lower than expected graduation rates. These rates are reflected in the AY 99-00, 00-01, and 01-02 graduation statistics (Table IV.4). While the average graduation rate is below the 1.2 five-year average threshold, the average number of students in the program (17.6 students) is significantly above the threshold of 4.5 students.
>
> Several years ago these results were anticipated and action was initiated to re-focus the doctoral program in terms of recruiting and scholarship. As a side note, one should keep in mind that graduation rates tend to trail matriculation by about four years. Results from this re-focus are apparent in the AY 02-03 and 03-04 statistics. In the mean time, the masters programs have matured and leveled off to some degree in resources required.

Table IV.4 current IE&M doctoral program statistics.

Industrial Engineering and Management PhD Program			
Graduates		Majors	
Academic Year	Number	Fall of Year	Number
99-00	0	00	13
00-01	1	01	11
01-02	0	02	21
02-03	3	03	22
03-04	2	04	21
Average	1.2		17.6

Faculty members with interests and capabilities to work with baccalaureate, masters, and doctoral students have been recruited since 2000. All faculty hired since 2000 (five faculty members) as well as several pre-2000 faculty members are active in our doctoral program (as well as our baccalaureate and masters programs). IE&M's "newer" faculty members (as well as "older" faculty members) have been productive in attracting research and working to support and establish center-based research to offer current and prospective doctoral students unique opportunities for technical and professional development.

IE&M's strategic plan provides for a balance between programs and strives for excellence in all programs. Regarding the doctoral program, IE&M seeks to maintain from 20 to 25 doctoral studies students. Currently we are operating within this range. In order to defend our doctoral program regarding productivity (specifically less than two graduates per AY on a five-year rolling average), our Graduate Program Director, with the help of our current doctoral students developed a graduation projection for the next few years. This graduation projection appears in Table IV.5.

Table IV.5 IE&M projected graduation rates.

	IE&M PhD Program	
AY	No. of Graduates	5-yr Moving Avg.
99-00	0	
00-01	1	
01-02	0	
02-03	3	
03-04	2	1.2
04-05	3*	1.8*
05-06	8*	3.2*
06-07	7*	4.6*
07-08	3*	4.6*
*Estimates		

The graduation projections are based only on the current doctoral students in our program. They do not reflect new students that will join our program. For example, new doctoral students entering the program in the next year should increase the estimated number of graduates in 2007 and 2008.

In addition to past efforts and activities to support our doctoral program, new efforts are underway to streamline our doctoral studies processes. The current process appears in the IE&M Web site www.okstate.edu/ceat/iem/.

These new efforts are focusing on program requirements and the sequences thereof, as well as faculty workload and incentives to enhance scholarship within the profession.

In summary, the doctoral program in IE&M is currently productive, and estimates indicate that its five-year rolling average will exceed the Regent's threshold by AY 05-06. Its current state is a product of a re-focus, careful hiring practices, dedication to research, and hard work. The IE&M faculty believes that the facts and figures above fully support and justify doctoral studies – should you need additional facts and figures please contact W. Kolarik at 405-744-5042 or kolarik@okstate.edu.

CRITERION V
Quality
A. Program Faculty Qualifications

The IE&M faculty is described in Table V.1. Fourteen faculty members are listed along with several part-time instructors. Of the 14 full-time faculty members, Dr. Branson will retire March 1, leaving IE&M with a faculty of 13 FTE. IE&M programs deal with both theoretical aspects of industrial engineering and management as well as with professional practice. We seek to maintain a balanced faculty in terms of ranks and theory/practice orientation.

Our faculty continues to win numerous educational awards. For example, Dr. Allen Schuermann (retired in spring 2004) won the 2002 College Advising Award for his work in integrating personal attention and database technology within the advising process. Dr. Manju Kamath won the same award in 2004 for his work and mentorship of graduate students. Dr. David Pratt won the Regents Distinguished Teaching Award presented at the University level in 2004. Drs. Case, DeYong, Kamath, Pratt, and Yauch, together, won over 15 teaching awards within the last three years. In addition, over one-third of our faculty members are Fellows within their respective professional societies.

Table V.1 summary of faculty, degrees, and experience.

Name	Faculty Status (Regular or Adjunct)	Faculty FTE In Program	Degrees Earned		Related Work Experience (Years)
			Highest	Highest in Teaching Area	
			Type	Type	
Branson, Michael	Associate Professor	FT	PhD	PhD	3
Bukkapatnam, Satish	Associate Professor	FT	PhD	PhD	.5
Case, Kenneth	Regents Professor	FT	PhD	PhD	2
DeYong, Camille	Associate Professor	FT	PhD	PhD	2
Ingalls, Ricki	Associate Professor	FT	PhD	PhD	16
Kamath, Manjunath	Professor	FT	PhD	PhD	0
Kolarik, William	Professor & Head	FT	PhD	PhD	5
Mandeville, David	Associate Professor	FT	PhD	PhD	20
Nazemetz, John	Associate Professor	FT	PhD	PhD	2
Oliveira, Carlos	Assistant Professor	FT	PhD	PhD	0
Pratt, David	Associate Professor	FT	PhD	PhD	13
Rossler, Paul	Associate Professor	FT	PhD	PhD	6
Turner, Wayne	Regents Professor	FT	PhD	PhD	6
Yauch, Charlene	Assistant Professor	FT	PhD	PhD	4
Part Time Faculty:					
Blackshare, Derek	Lecturer	PT	MS	MS	16
Mukul Patki	Teaching Assistant	PT	MS	MS	0
Mills, J. Randall	Adjunct Professor	PT	PhD	PhD	24

B. Evidence of Regional/National Reputation and Ranking

Historically, IE&M has been ranked at about 25 in the U.S. News and World national report (for schools with doctoral programs). For 2005, only the top 20 programs are shown in the Industrial and Manufacturing Engineering category. IE&M is not listed in the 2005 top 20.

C. Scholarly Activity

IE&M faculty members have generally been active in the pursuit of scholarly endeavors. In the past, participation was limited to about half of the faculty membership. The scholarly element has been emphasized over the past few years. Newer faculty members have seen elevated expectations expressed in the hiring, reappointment, tenure, and promotion processes. Detailed accomplishments for our faculty appear in Appendix B Record of Significant Scholarly, Artistic and/or Creative Work. Appendix B does not include the research performance record for IE&M, even though most research has a scholarship dimension. Please refer to Section III.C for a description of research activity.

D. Assessment of Student Achievement of Expected Learning Outcomes for Each Degree Program

Educational Objectives (knowledge and skills students should develop from two to five years out of school) and program outcomes for baccalaureate, masters, and doctoral programs were described in Criterion I, Section A Goals and Objectives of Degree Programs. The accomplishment of educational objectives is measured on two-year intervals. Baccalaureate graduates are surveyed by University Assessment (OSU) one year and masters and doctoral graduates the other year – then the cycle is repeated.

Program outcomes are assessed two ways. First, course outcomes are surveyed each semester (indirect assessment). These surveys are conducted and complied by IE&M staff. Coverage here includes all classroom courses taught each semester. These surveys cover the course outcome expectations expressed on the syllabus from each course. Results from the course surveys are summarized and placed in each course portfolio (a record of syllabus, assignments, homework, tests, projects, labs). These same results are fed back to instructors for their evaluation and inclusion in course assessment and improvement (for the next time the course is taught).

The second form of assessment (direct assessment) is a collection of course/program material (evaluated by the instructor) which is linked to stated program outcomes. This form of assessment started about two years ago at the undergraduate level and is moving across both the undergraduate and graduate levels. Other forms of direct assessment are located in the senior capstone design course (required of all baccalaureate students) and the thesis and dissertation defenses. Finally, the Fundamentals of Engineering (FE) Exam is used to assess the performance of IE&M students relative to state and national performance on the same.

The direct as well as the indirect assessment is multi-faceted and leads to faculty discussions and actions as to program effectiveness. A sample of information regarding the educational objectives appears below:

> Graduating students were asked to rate their abilities and their preparation regarding each objective. Results containing averages from the fall 2003 and spring 2004 exit surveys of BS and MS graduates provided the following information, Table V.2.

Table V.2 exit survey results regarding program outcomes

Undergraduates (Fall 2003 and Spring 2004, n=26)

i. Ability = 2.74 Preparation (at OSU) = 2.85
ii. Ability = 2.56 Preparation = 2.46
iii. Ability = 2.81 Preparation = 2.71
iv. Ability = 3.15 Preparation = 2.89

Graduates (Fall 2003 and Spring 2004, n=12)

i. Ability = 2.83 Preparation = 2.92
ii. Ability = 2.58 Preparation = 2.50
iii. Ability = 3.00 Preparation = 2.92
iv. Ability = 3.08 Preparation = 3.00

Scale: 0 = poor; 1 = marginal; 2 = good; 3 = very good; 4 = mastery/outstanding

Comparable statistics from fall 2002 and spring 2003 are presented below.

Undergraduates (Fall 2002 and Spring 2003, n=17)

i. Ability = 2.53 Preparation (at OSU) = 2.41
ii. Ability = 2.35 Preparation = 1.94
iii. Ability = 2.59 Preparation = 2.17
iv. Ability = 2.94 Preparation = 2.53

Graduates (Fall 2002 and Spring 2003, n=11)

i. Ability = 2.27 Preparation = 2.27
ii. Ability = 2.00 Preparation = 2.18
iii. Ability = 2.45 Preparation = 2.73
iv. Ability = 2.91 Preparation = 2.91

Scale: 0 = poor; 1 = marginal; 2 = good; 3 = very good; 4 = mastery/outstanding

IE&M FE exam results appear in Table V.3. The display below summarizes our FE exam results since 1998. Scores on the FE are provided for both the school and for the nation.

We collect information at more detailed levels than that reflected in the overall exit survey and FE exam statistics. We use open-ended questions on surveys and use the student advisory councils as sources for detailed information. Instructor evaluations of course outcome attainment and suggested improvements regarding the same are collected. This information helps us to locate specific issues and ideas. This information is fed back into the faculty at faculty meetings or at the two work sessions (one full day in the fall and one-half day in the spring) and to the IAB during their semi-annual on-site visits. Improvements are put in place for the next term or after proper approval from the University is obtained. For example, major course/curricular changes require several levels of approval and require at least one year to implement, whereas smaller improvements in a course or the curriculum can be implemented before the next term begins.

Table V.3 Fundamentals of Engineering examination results.

Exam Date	Number of Students (IE&M)	Number of IE Students (National)	IE&M Pass Rate	National Pass Rate
1998-2003 (AM section)	58	2,479	84%	70%
1998-2003 (PM section - general)	9	187	78%	63%
1998-2003 (PM section - IE)	49	2,292	86%	70%
April 1999 (AM and PM)	3	216	100%	75%
Oct 1999 (AM and PM)	11	175	100%	75%
April 2000 (AM and PM)	2	300	100%	69%
Oct 2000 (AM and PM)	6	160	83%	74%
April 2001 (AM and PM)	5	291	80%	65%
Oct 2001 (AM and PM)	4	181	75%	70%
April 2002 (AM and PM)	5	327	60%	67%
Oct 2002 (AM and PM)	9	223	78%	69%
April 2003 (AM and PM)	6	376	67%	70%
Oct 2003 (AM and PM)	7	230	100%	67%
April 2004 (AM and PM)	8	340	88%	68%
Oct 2004 (AM and PM)	9	169	89%	59%

E. Overview of Results from Program Outcomes Assessment

Fundamentals of Engineering examination results typically fall above the national average and indicate that our program is solid. Masters and doctoral graduates produce theses and dissertations that reflect significant research and technical insight as judged by the faculty and peers. Senior project capstone projects are judged by the IE&M faculty and client organizations to assess the level of technical content and professionalism associated with each team.

We continue to introduce significant changes in our program, courses, and physical resources. Program and course foci have been expanded and sharpened in all areas. In 2001 we redesigned our graduate studies in terms of updating our courses and wrapping the program around our new faculty members (three new faculty members). A major undergraduate program redesign project, in collaboration with the Industrial Advisory Board, is in midstream. This redesign is in response to shifts in professional practice as well as internal program assessments. In general, improvements fall into three categories: (1) process, (2) program, and (3) course. The list below is a summary of major changes undertaken in IE&M as a result of program and course assessments (over the past five years):

Process-related improvements:

- The explicit naming and involvement of constituencies –
  - the reestablishment of the IAB.
  - the formation of the Student Advisory Councils.
- Development of vision, mission, core values, objectives, and outcome statements.
- The Alumni Survey and its alignment with program objectives statements.
- The Exit Survey and its alignment with program objectives and outcomes.
- Better student-faculty communications.

Program-related improvements:

- The redesign of the graduate program in terms of courses and specialty areas.
- The redesign of the undergraduate curriculum (under way).
- The redesign of the student advising system.
- The development of course portfolios, course outcomes, and formal instructor evaluations and the sharing of the information therein.
- Major upgrades of student laboratories.
- Upgraded presentation support with dedicated color printers for IE&M students.
- Restructuring of the course offerings prior to entry into senior projects (IEM 4913).
- Strengthening project management skills across the curriculum.
- More student-friendly IE&M Web site.

Course-related improvements:

- New graduate-level course offerings, clustered in specialty areas: (1) engineering management, (2) manufacturing systems, (3) operations research, (4) quality and reliability, (5) facilities, energy and environmental management, and (6) enterprise modeling and supply chains.
- Outcome-based course structures and performance surveys (and the improvement of our capabilities in writing course outcomes and assessing the same, related to program outcomes).
- Course topic mappings to program outcomes and objectives.
- Restructuring and coordination of IEM 4913.
- Coordination and action to make STAT 4033 more effective for IE&M students.
- Addition of a research methods course for undergraduates (IEM 4010).
- Better coordination of Web-based educational materials.
- Numerous course-level improvements.

In the past two years we have completed the re-design of our capstone design course IEM 4913. The course now has a stronger component in project management and more nearly resembles an initial professional experience similar to one a graduate would encounter in their first professional position. These improvements are multi-dimensional and include project planning-management, reporting/communication, and teaming. Inputs from the IAB and students were used to develop and fine-tune the course to its present state. Information and experience gained from our client companies is also used to fine-tune the course and to help us select appropriate clients for the next offering. In summary, this improvement was the result of using a number of assessment tools and resources to redesign our most significant undergraduate course. The course will continue to evolve and improve through continuous improvement.

Resources are traditionally tight, however, we have made significant upgrades to our facilities in response to information we gained from our constituents. We have upgraded our office area to accommodate student needs in specialized software and hardware access for project work and communications work. We have upgraded our computers and color printing capabilities for our students. This last year we added a color laser printer for our students. These upgrades were in response to feedback from our students, especially through the Student Advisory Councils.

Hands-on experience is valued by our employers and appreciated by our students, based on information collected through exit surveys, advisory councils, and ad hoc discussions with students and employers. We completed a major upgrade of our manufacturing lab (with Engineering Technology as our partner). We are now a Haas

Technical Center. As such, we purchased a CNC 4-axis machining center and were entrusted with a CNC lathe from Haas. This upgrade was long overdue, based on feedback from all constituencies, students, faculty, alumni, and employers. Other significant upgrades were made in our Work Performance and Ergonomics Laboratory. These upgrades included new computers, printers, electronic screw drivers, and other equipment. All-in-all these laboratory upgrades added about $250,000 of educational infrastructure for IE&M, after considering the leveraged part of the upgrades (i.e., the entrusted machine, tooling, ...). These improvements involved constituencies in order to determine what would best suit IE&M student needs. Funds were obtained through the Master Lease Program.

Note: The tools and techniques that we are using in our assessment processes were gained in collaboration with the Office of University Assessment. Their work in alumni surveys (and other surveys) has been helpful in gaining perspectives that are beyond our departmental resource base.

F. Feedback from Program Alumni/Documented Achievements of Program Graduates

Our students are competitive in national competition. For example, Katie Frye, a 2002 graduate, won the National IIE Student Paper Competition in 2002 with her (team) capstone design work, as presented in Orlando, Florida. Christina Lupher, a 2003 graduate, won the 2003 IIE Student Award for Excellence (first place in national competition, Portland, Oregon). Over the last four years, more than 15 students have been successful in national-level scholarship competition. For example, in 2003, Jennifer Stafford, an IE&M junior, won the United Parcel Service Scholarship for Minority Students and was recognized for the same at the IIE National Conference in Portland, Oregon.

G. Other Program Evaluations

The BSIE&M Program has a long history of accreditation by ABET (the major accreditation council for engineering programs). Last year our BSIE&M Program was up for re-accreditation. The site visit occurred in September 2003. Official results were presented during the summer of 2004. As it stands, the BSIE&M Program is accredited for six years going forward (the maximum length of accreditation offered by ABET).

CRITERION VI
Program Demand/Need

A. Occupation Manpower Demand

Demand for engineers in general is strong. National concerns regarding the low numbers of students enrolled in engineering programs is well known. This situation has gained the attention of both academics and industrialists. Programs aimed at K-12 college preparatory programs have been designed and implemented to help potential college students understand more about engineering and the job opportunities therein. IE&M participates in CEAT presentations to Project Lead the Way students when they come to visit our College. For example, in the last two months, IE&M has made six presentations (with respect to who we are and what we do) to high school student in Project Lead the Way.

IE&M has an Industrial Advisory Board made up of alumni and potential employers. The Board consists of 12 industrialists. Board members represent manufacturing as well as service industries.

Pat Arthur; UPS
Kelly Beierschmitt; Oakridge National Laboratory
Gary Hook; OCALC Tinker AFB
Patti Jordan; Webco Industries
Ann Krieser; Celestica
Ying Tat Leung; IBM
Neal McCollom; Lockheed Martin
Mitch Myers; F W Murphy
Dayton Sitz; Haliburton
Dennis Ward; Smith International
Doug White; Independent Oil and Gas Consultant
Stacie Wrobbel; ExxonMobil

As one of IE&M's three constituency groups, the Board meets two times per year on the OSU campus. The Board focuses on program-level assessment and improvement for one day in the fall term and one day in the spring term. The Board's input is sought regarding strategic practices and processes within IE&M. For example, the Board helps us understand practical perspectives in our program. They have helped us improve our senior design course and make it more realistic as per first assignments in professional practice. They are helping us to redesign our undergraduate program to meet the needs of industry now and into the future. They provide timely feedback as per our project content as well as student teamwork and communication skills content. This spring they will help develop direct assessment of our senior project presentations, as our spring meeting is scheduled to match our spring senior project final presentations.

In terms of demand, IE&M is having difficulty filling interview slots with companies coming on campus to interview our future graduates. Typical positions offered to our BSIE&M students command salaries between $45,000 and $55,000 per year, depending on the company, its business, and its location. Masters and doctoral graduate salaries are typically higher, some approaching $80,000 to $90,000 per year.

B. Societal Needs for the Program

The profession of industrial engineering has always focused on making organizations more efficient (productivity in converting resources to product). IE&M has expanded the historical role of industrial engineering to include product and process quality as well as productivity. This combined focus allows companies to be more successful and competitive. We have had three faculty members serve in the Malcolm Baldrige National Quality Award examiners' group. This service allows faculty to see first-hand nationally competitive organizations and to evaluate the same. Hence, our programs are more focused on state and national needs and competition than most.

C. Graduate Student Applications and Enrollment Changes

Traditional on-campus graduate student-related statistics for the MSIE&M and PhD programs appear in Table VI.1 and Table VI.2. These statistics were supplied to IE&M from OSU Institutional Research. Table VI.1 provides enrollment and graduation statistics. These trends were previously discussed in Criterion IV (Productivity). Table VI.2 provides statistics for graduate program applications, acceptances and new enrollments. While the statistics in Table VI.1 are accurate, the statistics in Table VI.2 (taken only in the fall) do not reflect the total applications, acceptances, and/or new enrollments for each year. For example, total new enrollments in the MS category were roughly double the figures shown (based on records kept in IE&M). Comparable figures for total new enrollments in the MS category were 39, 56, and 34 for 2002, 2003, and 2004, respectively (according to IE&M records).

The "average" time in the MS program for a full-time student is approximately two years. This time in program is fairly steady and very stable for students in the non-thesis program. The thesis program students may remain in the program longer if thesis research is not carefully planed and scheduled. Even with careful plans, delays may be encountered if the research encounters unexpected problems.

Table VI.1 enrolled and graduated graduate student counts.

	2002	2003	2004		2002	2003	2004
	Enrolled				Graduations		
Masters							
Domestic	8	10	6		2	5	6
International	93	103	86		17	35	45
Total	101	113	92		19	40	51
Doctoral							
Domestic	7	8	7		0	1	2
International	14	14	14		0	2	0
Total	21	22	21		0	3	2

Table VI.2 applications, acceptances, and new enrollments for graduate students.

	2002	2003	2004		2002	2003	2004		2002	2003	2004
	Applications				Acceptances				New Enrollments		
Masters											
Domestic	6	6	5		15	9	3		5	5	3
International	252	223	123		124	131	75		8	11	19
Total	258	229	128		139	140	78		13	16	22
Doctoral											
Domestic	2	3	2		2	3	1		1	1	1
International	23	26	19		13	6	2		4	3	0
Total	25	29	21		15	9	3		5	4	1

Time to graduate in the doctoral program is subject to substantial variation, many times beyond an expected four or five years. This variation is encountered for a number of reasons. Dissertation research problems arise from time to time. Some doctoral students hold full-time faculty positions at other universities and work part-time to finish their degrees. Other doctoral students may terminate their doctoral studies to pursue a position in consulting or industry. Consulting and industrial employers are not shy about making offers to entice students out of doctoral programs.

The counting of applications is somewhat imprecise, as it takes several weeks to complete a full application, especially an international application. Some applicants, especially international applicants ask for and are granted deferments and hence an application, acceptance, and enrollment may be a prolonged sequence of events. In addition, some applications are never completed, even though they are held for a long period of time. The number of applications, particularly from international applicants, has declined in the last year or two. Both economic and security factors are likely responsible for the decline, as this trend is common across the country. The number of acceptances usually follows the number of applications.

IE&M works on a case by case basis when accepting or rejecting a graduate program applicant. As a general rule, we typically accept about half of the applicants, and then about half of the accepted applicants enroll in our program. There are exceptions from time to time. The majority of graduate students, especially international masters students, are not offered assistantship money by IE&M prior to enrollment. About 40 to 50% of our graduate students eventually receive an assistantship – based on their early performance in the IE&M program. If we offered an assistantship when a student was accepted, a higher percentage of the accepted students would enroll.

At the doctoral level, we will typically offer assistantship support up front. However, we do not accept a doctoral applicant unless we have a faculty "champion" for that applicant. Hence, we may well receive several well qualified applications and choose to reject them if our faculty interest and resources are not adequate to support that applicant.

CRITERION VII
Program Duplication

A. Identify Other Degree Programs at OSU with Similar Titles or Functions

No degree programs at OSU have similar functions. Nevertheless, we do work with other colleges, such as Business Administration, to offer our students courses and experiences which will round their program out.

B. For Similar Programs, Describe How Each Degree Program Fulfills Unique Student Needs

SUMMARY AND RCOMMENDATIONS

A. Strengths

The Industrial Engineering and Management Program was founded in 1925 by a handful of dedicated faculty members and students. Today, it serves over 120 undergraduate students, over 100 graduate students, and over 200 interdisciplinary graduate students, with 13 dedicated faculty members. Our programs include baccalaureate, masters, and doctoral programs (http://www.okstate.edu/ceat/iem/). The Industrial Engineering and Management Program (IE&M) is guided by our vision, mission, and core values, and operates within a set of technical competencies which include (1) engineering management, (2) manufacturing systems, (3) operations research, (4) quality and reliability, (5) facilities, energy and environmental management, and (6) enterprise modeling and supply chains.

IE&M relies on its three constituencies for its strength; students, faculty, and alumni and employers. Our faculty members represent a cross section of professional expertise and practice. In general our faculty members are active in the profession, as evidenced by their accomplishments (please refer to Appendix B). Our faculty continues to win numerous educational awards. For example, Dr. Allen Schuermann won the 2002 College Advising Award for his work in integrating personal attention and database technology within the advising process. Dr. Manju Kamath won the same award in 2004 for his work and mentorship of graduate students. Dr. David Pratt won the Regents Distinguished Teaching Award presented at the University level in 2004. Drs. Case, DeYong, Kamath, Pratt, and Yauch, together, won over 15 teaching awards within the last three years. In addition, over one-third of our faculty members are Fellows within their respective professional societies.

Our baccalaureate program's strength lies in its heavy engineering core at the pre-professional school level and its professional focus at the professional school level. We rely on our Industrial Advisory Board (representing alumni and employers) as well as on ad hoc discussions with alumni and employers to define, refine, and maintain our focus on a general-purpose graduate with technical competence, a strong work ethic, and a hands-on attitude to work within an employer's organization.

Fundamentals of Engineering examination results typically fall above the national average and indicate that our program is solid. Our students are competitive in national competition. For example, Katie Frye, a 2002 graduate, won the National IIE Student Paper Competition in 2002 with her (team) capstone design work, as presented in Orlando, Florida. Christina Lupher, a 2003 graduate, won the 2003 IIE Student Award for Excellence (first place in national competition, Portland, Oregon). Over the last three years, more than 10 students have been successful in national-level scholarship competition. For example, in 2003, Jennifer Stafford, an IE&M junior, won the United Parcel Service Scholarship for Minority Students and was recognized for the same at the IIE National Conference in Portland, Oregon.

At the graduate level, our faculty's varied expertise in specific technical areas provides an in-depth experience for our graduate students. At the same time, our graduate plan of study requirements for broader knowledge (beyond a single area of expertise) allow our graduate students to gain perspective in their studies. This approach helps our graduate students define a plan of study that meets their needs. Some needs are driven by professional practice; these needs are accommodated by our non-thesis track. Some needs are driven by research and scholarship; our thesis track and doctoral program serves these needs. Hence, graduate students have flexibility in the design of their program to suit their goals and objectives.

B. Areas for Improvement

IE&M faces several challenges. The program has moved from a traditional educational approach to an outcome-based approach. An integrated process of objectives and outcomes assessment is in place, subject to semi-annual and annual improvement cycles. Periodic programmatic redesign cycles are initiated on an "as needed" basis, where "as needed" is determined by IE&M constituents. The outcome-based transformation was initiated in 1999 and is expected to continue into the future. The outcome-based approach, while not new to education in general, has been a learning experience for our faculty and staff. As we continue to learn, we will continue to improve and polish our approach and its integration, assessment, and development, with an expectation of improved program effectiveness and efficiency.

IE&M has 13 dedicated faculty members and a staff of three people. We are constantly seeking to improve our knowledge and skill bases in order to update our program. Our accomplishments in this area are generally very good. We have been able to replace faculty members who have retired with talented and dedicated new faculty members. On the physical resource side, we typically encounter significant challenges to keep our laboratories, computers, and software up to date.

The competition for bright and dedicated students at both the undergraduate and graduate level is our major challenge. Our most successful peer institutions tend to have more resources to offer prospective students in terms of scholarships and assistantships. We have relied primarily on our reputation for producing solid graduates and the potential for building lasting relationships with our faculty members. This strategy has served us reasonably well in the past, but will likely be challenged in the near future. Assuming little if any help from State resources, our most likely means to generate these resources is through extramural research contracts, grants, and gifts. IE&M has been working to strengthen our efforts in these areas, but much more work remains to be accomplished.

C. Recommendations for Action

IE&M continues to introduce significant changes in our programs, courses, and physical resources. Program and course foci have been expanded and sharpened in all areas. In 2001 we redesigned our graduate studies in terms of updating our courses and wrapping the program around our new faculty members (three new faculty members). A major undergraduate program redesign project, in collaboration with the Industrial Advisory Board, is in midstream. This redesign is in response to shifts in professional practice as well as internal program assessments. In general, improvements fall into three categories: (1) process, (2) program, and (3) course. The list below is a summary of major changes in the last five or six years undertaken in IE&M as a result of program and course assessments:

Process-related improvements:

- The explicit naming and involvement of constituencies –
  - the reestablishment of the IAB.
  - the formation of the Student Advisory Councils.
- Development of vision, mission, core values, objectives, and outcome statements.
- The Alumni Survey and its alignment with program objectives statements.
- The Exit Survey and its alignment with program objectives and outcomes.
- Better student-faculty communications.

Program-related improvements:

- The redesign of the graduate program in terms of courses and specialty areas.
- The redesign of the undergraduate curriculum (under way).
- The redesign of the student advising system.
- The development of course portfolios, course outcomes, and formal instructor evaluations and the sharing of the information therein.
- Major upgrades of student laboratories.
- Upgraded presentation support with dedicated color printers for IE&M students.
- Restructuring of the course offerings prior to entry into senior projects (IEM 4913).
- Strengthening project management skills across the curriculum.
- More student-friendly IE&M Web site.

Course-related improvements:

- New graduate-level course offerings, clustered in specialty areas: (1) engineering management, (2) manufacturing systems, (3) operations research, (4) quality and reliability, (5) facilities, energy and environmental management, and (6) enterprise modeling and supply chains.
- Outcome-based course structures and performance surveys (and the improvement of our capabilities in writing course outcomes and assessing the same, related to program outcomes).
- Course topic mappings to program outcomes and objectives.
- Restructuring and coordination of IEM 4913.
- Coordination and action to make STAT 4033 more effective for IE&M students.

- Addition of a research methods course for undergraduates (IEM 4010).
- Better coordination of Web-based educational materials.
- Numerous course-level improvements.

Resources are traditionally tight; however, we have made significant upgrades to our facilities. We have upgraded our office area to accommodate student needs in specialized software and hardware access for project work and communications work. We have converted our primary classroom/lab to a multimedia presentation room. We have added full-scale CAD/CAM equipment to our manufacturing laboratory, as well as upgrade equipment in our work analysis and ergonomics laboratory. Hence, we are (and will be) better able to provide more hands-on opportunities to our students. Primary characteristics of our graduates are hands-on attitudes and abilities.

IE&M prides itself in attempting to proact to changes. Most of the changes described above were accomplished in a proactive mode. As such, our last re-accreditation process (2003-2004) went very smoothly and elicited favorable comments from our reviewers. Hence, no significant action items are on the table, with the one exception of moving the doctoral program forward (please refer to the discussion/plan described in Criterion IV.C).

D. Five-Year Goals for the Program

The IE&M Programs have set out a strategic plan which is aligned with the OSU and College strategic plans. In summary, the IE&M plan emphasizes quality. In order to make gains toward this end, a "right sizing of program" is a major goal. Emphases on research and scholarship are major goals, in addition to solid teaching and student support. We are committed to helping the State and Nation develop economically and to provide solid industrial engineering resources for the same.

Appendix A

External Grants, Contracts, and Gifts 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
Problem Parts - Task 4.2	Carolina, M.	Sverdrup Technologies				$105,127	
Steam Tool Benchmarking Support	Christenson, C.D.	UT-Battelle for Oak Ridge National Laboratory for United States Department of Energy	$24,999				
Industrial Assessment Center	Christenson, C.D. Turner, W.C.	University City Science Center	$153,500	$10,800			
Bank of Oklahoma Assistance & Assessment	DeYong, C.F.	Bank of Oklahoma				$54,946	
Relevancy Enhancement Achieved by Laboratories and Lecture Integrated for Engineering Education (REAL LIFE) Adoption of a Relevant Undergraduate Curriculum	DeYong, C.F.	National Science Foundation				$14,017	
Demand Forecasting - Task 2.1	DeYong, C.F.	Sverdrup Technologies			$267,959	$108,790	
Management and Assessment - Task 8.0	DeYong, C.F.	Sverdrup Technologies			$14,734	$17,712	
Reaching Engineering and Architecture Career Heights	DeYong, C.F. Bilbeisi, S.D.	Oklahoma State Regents for Higher Education	$20,600	$31,500			
Fleet and Chemical Optimization for Oilfield Enhancement Services	Ingalls, R.G.	Halliburton Energy Services					$60,000
Fleet Optimization for Oilfield Production Enhancement Services	Ingalls, R.G.	Halliburton Energy Services					$50,000
CELDi (Collaborative Research: Center for Engineering Logistics and Distribution)	Ingalls, R.G.	National Science Foundation			$150,000		
Success Factors in eProcurement and eTrading in the Petroleum Industry	Ingalls, R.G.	Phillips Petroleum Company			$50,000	$21,000	
Manufacturing and Distribution Strategies for Volatile and Cyclical Customer Demand	Ingalls, R.G.	Smith Tool				$50,000	
CELDi (Collaborative Research: Center for Engineering Logistics and Distribution) Income Account	Ingalls, R.G.	University of Louisville					$1,122

Appendix A

External Grants, Contracts, and Gifts 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**
CELDi (Collaborative Research: Center for Engineering Logistics and Distribution) Income Account	Ingalls, R.G.	University of Oklahoma					$1,122
Freight Movement Model Development for Oklahoma	Ingalls, R.G. Kamath, M.	Oklahoma Transportation Center for Oklahoma Department of Transportation			$29,246	$33,618	$89,964
Health Monitor for Automation	Ingalls, R.G. Rhinehart, R.R.	Measurement and Control Engineering Center			$16,000		
Scalable Enterprise Systems: A User-Oriented Framework for Process and Performance Modeling of Enterprise Systems	Kamath, M. Kolarik, W.J.	National Science Foundation		$92,775			
Human Reliability and Safety for Safe Handling and Long-Term Storage of Nuclear Components	Kolarik, W.J.	Texas Tech University	$8,250				
Industrial Assessment Center Program	Kolarik, W.J. Turner, W.C.	Department of Energy				$193,484	$214,163
Oklahoma Forest Industries Technology Program	Kolarik, W.J. Turner, W.C.	Oklahoma Center for the Advancement of Science and Technology					$12,500
Industrial Assessment Center	Kolarik, W.J. Turner, W.C.	University City Science Center		$185,500	$178,500	$7,500	
Web Based/CD Interactive Training	Nazemetz, J.W.	Altech Services, Inc.				$60,143	
Industrial Data Exchange/Composite Video and Information Technology in Training	Nazemetz, J.W.	Automated Science Group, Inc.			$42,403		
Use of XML in the Exchange of Industrial Product Data and Composite Video for Instruction Training	Nazemetz, J.W.	Automated Science Group, Inc.			$38,062		
Training/Operation Instructions for Aircraft Ground Equipment	Nazemetz, J.W.	Automated Sciences Group, Inc.				$299	

Appendix A

External Grants, Contracts, and Gifts 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
Design, Implementation & Documentation of Manufacturing Process	Nazemetz, J.W.	BS&B Safety Systems, L.L.C.					$4,602
Initial Problem Identification and Engineering Study for Improved Product Life Cycle Support (PLCS) for Aircraft Structural Components	Nazemetz, J.W.	Science Application International Corporation for US Air Force		$72,822	$39,050		
ISF Development & Operations - Task 2.1	Nazemetz, J.W.	Small Business Innovation Research Engineering, Inc.	$12,397				
Standards Development - Task 4.3	Nazemetz, J.W.	Small Business Innovation Research Engineering, Inc.	$69,041				
Standards Development and Training - WBS 3.1.4.1	Nazemetz, J.W.	Small Business Innovation Research Engineering, Inc.	$83,436				
Standards Training - Task 6.3	Nazemetz, J.W.	Small Business Innovation Research Engineering, Inc.	$16,556				
XML Standards Integration - WBS 4.2.1	Nazemetz, J.W.	Small Business Innovation Research Engineering, Inc.	$61,886				
Standards Development and Training - WBS 6.1	Nazemetz, J.W.	Sverdrup Technologies		$53,182			
Project Collaboration (Phase III)	Nazemetz, J.W.	Tec-Masters, Inc.					$205,081
FAA-Maintenance/Logistics Support of the ACE-IDS System	Nazemetz, J.W. Ingalls, R.G.	Federal Aviation Administration		$88,722			
Phase II Project Collaboration	Nazemetz, J.W. Rossler, P.E.	Altech Services, Inc.				$221,150	
Process Improvement Methodology Development	Nazemetz, J.W. Rossler, P.E.	Altech Services, Inc.				$27,060	
Robotic Lifting Devices	Nazemetz, J.W. Rossler, P.E.	Tec-Masters, Inc.					$61,206
Technology Forecasting - Task 4.2	Pratt, D.B. DeYong, C.F.	Small Business Innovation Research Engineering, Inc.	$100,465				
Technology Forecasting - Task 3.3	Pratt, D.B. DeYong, C.F. Nazemetz, J.W.	Small Business Innovation Research Engineering, Inc.	$3,500				

Appendix A

External Grants, Contracts, and Gifts 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**
Technical Aircraft and Support Infrastructure	Rossler, P.E.	Altech Services, Inc.				$56,431	
Energy Management Educational Programs	Turner, W.C.	The Fairmont Press / Association of Energy Engineers	$45,000	$6,126			
A Facility Systems Evaluation for Oklahoma Indian Health Services	Turner, W.C.	USPHS Indian Health Service				$55,000	
Association of Energy Engineers Educational Programs	Turner, W.C.	Wayne C. Turner			$25,513	$16,816	
Business Case for Standup Reverse Engineering Capability - Chemicals and Materials	Yauch, C.A.	Automated Science Group, Inc.			$29,932		
CAREER: Effects of Inter-Group Cooperation, Competition, and Conflict on Agile Manufacturing	Yauch, C.A.	National Science Foundation			$329,284		

APPENDIX B

Record of Significant Scholarly, Artistic and/or Creative Work (1999 to present)

Journal Articles Published

Bukkapatnam, S.

S.T.S. Bukkapatnam, S.R.T. Kumara and A. Lakhtakia, "Analysis of acoustic emission signals in machining," *ASME Transactions Journal of Manufacturing Science and Engineering*, Vol. 121, No. 4, pp. 568-573, 1999.

S.T.S. Bukkapatnam, S.R.T. Kumara and A. Lakhtakia, "Local eigenfunctions-based suboptimal wavelet packet representation of contaminated chaotic signals," *IMA Journal of Applied Mathematics*, Vol. 63, No. 2, pp. 149-160, 1999.

S.T.S. Bukkapatnam, S.R.T. Kumara and A. Lakhtakia, "Real-time chatter control in machining using chaos theory," *CIRP Journal of Manufacturing Systems*, Vol. 29, No. 4, pp. 321-326, 1999.

S. V. Kamarthi, S.T.S. Bukkapatnam and S. Hsieh, "An algorithm for near-optimal cutter path generation in stair-case milling of convex polygonal surfaces," *ASME Transactions Journal of Manufacturing Science and Engineering*, Vol. 122, pp. 182-189, 2000.

S.T.S. Bukkapatnam, S.R.T. Kumara and A. Lakhtakia, "Fractal estimation of flank wear in machining," *ASME Transactions Journal of Dynamic Systems Measurement and Control*, Vol. 122, pp. 89-94, 2000.

B. Khoshnevis, S.T.S. Bukkapatnam, H. Kwon, and J. Saito, "Experimental investigation into contour crafting of uncured ceramic materials," *Rapid Prototyping Journal*, Vol. 7, No. 1, pp. 32-41, 2001.

T. Loh, S. Bukkapatnam, D. Medeiros, and H. Kwon, "A new GA for simultaneous sequence and layout planning for PCB assemblies," *Computers and Industrial Engineering*, Vol. 40, pp. 293-307, 2001.

B. Khoshnevis, R. Russell, H. Kwon, and S.T.S. Bukkapatnam, "Crafting large prototypes," A featured refereed publication in a Special Issue of *IEEE Robotics and Automation Magazine*, Vol. 8, No. 3, pp. 33-42, 2001.

R. Palanna and S.T.S. Bukkapatnam, "Concept of model-based tampering for improved process performance," *International Journal of Machining Sciences and Technology*, Vol. 6, No. 2, pp. 271-290, 2002.

H. Kwon, S.T.S. Bukkapatnam, B. Khoshnevis, and J. Saito. "Effect of orifice geometry on surface quality in contour crafting," *Rapid Prototyping Journal*, Vol. 8, No. 3, pp. 147-160, 2002.

S.T.S. Bukkapatnam, S.R.T. Kumara, A. Lakhtakia, and P. Srinivasan, "Neighborhood method and its coupling with the wavelet method for nonlinear signal separation of contaminated chaotic time-series data," *Signal Processing*, Vol. 82, No. 10. pp. 1351-1374, 2002.

J. Zhao, S.T.S. Bukkapatnam, M.M. Dessouky, "Distributed architecture for real-time coordination of bus holding in transit networks," *IEEE Transactions on Intelligent Transportation Systems*, Vol. 4, No. 1, pp. 43-51, 2003.

R. Palanna, S.T.S. Bukkapatnam, F.S. Settles, "Model-based tampering for improved process performance: Application to grinding of shafts." *SME Journal of Manufacturing Processes*, Vol. 5. No. 1, pp. 24-32, 2003.

D. Chang and S.T.S. Bukkapatnam, "Microdynamics of acoustic emission generation in machining," *International Journal of Machining Sciences and Technology,* Vol. 8, No. 2, pp. 1-27, 2004.

S.T.S. Bukkapatnam, J. M. Nichols, M. Seaver, S. T. Trickey and M. Hunter, "A wavelet-based, distortion energy approach to structural health monitoring," *Structural Health Monitoring Journal,* 2004.

S.T.S. Bukkapatnam and K. Sadananda, "A genetic algorithm for predictive modeling of fatigue crack growth using unified approach," *International Journal of Fatigue,* 2005 (subject to modifications).

Case, K.

Dechert, Jerry D. and Kenneth E. Case, "An Economical Model for Clinical Quality Control," *Journal of Applied Statistics*, Volume 26, Number 5, April 1999. (refereed)

Dechert, Jerry, Kenneth E. Case, and Timothy L. Kautiainen, "Statistical Quality Control in the Presence of Large Measurement Variation," *Quality Engineering*, Volume 12, Issue 3, March 2000. (refereed)

Elam Matthew E. and Kenneth E. Case, "A Computer Program to Calculate Two Stage Short Run Control Chart Factors for ($\overline{\mathbf{X}}$,R) Charts," *Quality Engineering*, October 2001. (refereed)

Case, Kenneth E., "Coming Soon: the Future," *Quality Progress*, Volume 35, Number 11, November 2002. (Invited)

Case, Kenneth E., "Looking Toward the Future: The Seven Key Forces," a column in *News For A Change*, Association for Quality and Participation, January 2003. (invited)

Case, Kenneth E., "Looking Toward the Future: The Fruits of Knowledge," a column in *News For A Change*, Association for Quality and Participation, February 2003. (invited)

Case, Kenneth E., "Looking Toward the Future: Back to the Past," a column in *News For A Change*, Association for Quality and Participation, March 2003. (invited)

Case, Kenneth E., "Looking Toward the Future: Sustainability," a column in *News For A Change*, Association for Quality and Participation, May 2003. (Invited)

Case, Kenneth E., "Looking Toward the Future: The Garden of Quality," a column in *News For A Change*, Association for Quality and Participation, June 2003. (invited)

Case, Kenneth E., "Looking Toward the Future: Cross-Cutting Trends Affecting Quality," a column in *News For A Change*, Association for Quality and Participation, August 2003. (invited)

Elam, Matthew E. and Kenneth E. Case, "Two-Stage Short Run ($\overline{X}, \nu$) and ($\overline{X}, \sqrt{\nu}$) Control Charts," *Quality Engineering*, Volume 15, Number 3, 2003. (refereed)

Elam, Matthew E. and Kenneth E. Case, "A Computer Program to Calculate Two-Stage Short Run Control Chart Factors for ($\overline{X}, \nu$) and ($\overline{X}, \sqrt{\nu}$) Charts," *Quality Engineering*, Volume 15, Number 4, 2003. (refereed)

Elam, Matthew E. and Kenneth E. Case, "Two-Stage Short-Run $(\overline{X}, s)$ Control Charts," *Quality Engineering*, Volume 17, Number 1, 2005. (refereed)

Elam, Matthew E. and Kenneth E. Case, "A Computer Program to Calculate Two-Stage Short Run Control Chart Factors for $(\overline{X}, s)$ Charts," *Quality Engineering*, accepted for publication in 2004. (refereed)

DeYong, C.

Morris, S.M., Z.Wu, C.F. DeYong, S.Salman, and D. Yemenu (2001). DIVA: A Visualization System For Exploring Document Databases for Technology Forecasting, *Computers and Industrial Engineering.* V. 43, pp. 841-862.

Sehwail, L. and C. DeYong (2003). "Six Sigma in Health Care." International Journal of Health Care Quality Assurance incorporating Leadership in Health Services. V. 16, No. 4, pp. i-v.

Ingalls, R.

Sehwail, L., and R. G. Ingalls, Critical Success Factors for Online Marketplaces, To be published in *International Journal of Service and Operations Management.*

Ingalls, R.G., B.L. Foote and A. Krishnamoorthy, Reducing The Bullwhip Effect In Supply Chains With Control-Based Forecasting, To be published in *International Journal Of Simulation and Process Modelling.*

Ingalls, R.G. and D.J. Morrice, PERT Scheduling With Resource Constraints Using Qualitative Simulation Graphs, *Project Management Journal*, Vol. 35, No. 3 (September 2004), pp. 5-14.

Ingalls, R. G., and B.L. Foote, 2003. Control-Based Life Cycle Forecasting. *IEEE Transactions on Electronics Packaging Manufacturing.* Vol. 26, No. 1, (January 2003)

Ingalls, R. G., D. J. Morrice, E. Yücesan, A. B. Whinston. Execution Conditions: a Formalization of Event Cancellation in Simulation Graphs. *INFORMS Journal on Computing,* Vol. 15, No. 3 (Fall 2003).

Ingalls, R. G., D. J. Morrice, A. B. Whinston. The Implementation of Temporal Intervals in Qualitative Simulation Graphs, *ACM Transactions on Modeling and Computer Simulation,* Vol. 10, No. 3 (July 2000), pp. 215-240.

Kamath, M.

Greve, R.A., R. Sharda, M. Kamath, and A. Kadam, "Modelling and analysis of e-mail management for improved customer relationship management," *International Journal of Simulation & Process Modelling*, (in print).

Ramachandran, P. and M. Kamath, "A sufficient condition for reachability in a general Petri net," *Discrete Event Dynamic Systems: Theory and Applications*, Vol. 14, No. 3, 251-266, 2004.

Dalal, N., M. Kamath, W. Kolarik, and E. Sivaraman, "Toward an integrated framework for modeling enterprise processes," *Communications of the ACM,* Vol. 47, No. 3, 83-87, 2004.

Delen, D., D. Pratt, and M. Kamath, 2001, "Enabling multi-use, multi-tool models of manufacturing systems through an experimental frame expert system," *Journal of Intelligent Manufacturing*, Vol. 12, No. 3, pp. 247-255.

Krishnamoorthy, B. and M. Kamath, 2000, "Scheduling in a cellular manufacturing environment: a review of recent research," *Engineering Valuation and Cost Analysis*, Vol. 2., pp. 409-423.

Kolarik, W.

Kolarik, W. J., J. Woldstad, S. Lu, and H. Lu, "Human Performance Reliability: On –Line Assessment Using Fuzzy Logic," *IIE Transactions*, Vol. 36, No. 5, pp. 457-467, 2004.

Dalal, N., M. Kamath, W. Kolarik, and E. Sivaraman, "Towards an Integrated Framework for Modeling Enterprise Processes," *Communications of the ACM*, Vol. 47, No. 3, pp. 83-87, 2004.

Lu, H., W. Kolarik, and S. Lu, "Real-Time Performance Reliability Prediction," *IEEE Transactions on Reliability*, Vol. 50, No. 4, pp. 353-357, 2001.

Lu, S., H. Lu, and W. Kolarik, "Multivariate Performance Reliability Prediction in Real-Time," *Reliability Engineering and System Safety*, Vol. 72, No. 1, pp. 39-45, 2001.

Pratt, D.

Delen, D., D.B. Pratt, and M. Kamath, "Enabling Multi-Use, Multi-Tool Models of Manufacturing Systems Through an Experimental Frame Expert System," Journal of Intelligent Manufacturing, Vol. 12, No. 3, 247-255, 2001.

Morris, S.A. and D.B. Pratt, "Analysis of the Lotka-Volterra Competition Equations as a Technological Substitution Model," Technological Forecasting and Social Change, Vol 70, 103-133, 2003.

Oliveira, C.

Don Grundel, Carlos A.S. Oliveira, Panos M. Pardalos, and Eduardo Pasiliao. Asymptotic results for random multidimensional assignment problems. Computational Optimization and Applications, 30, 2005. In press.

Don A. Grundel, Pavlo Krokhmal, Carlos A.S. Oliveira, and Panos M. Pardalos. On the average case behavior of the multidimensional assignment problem. Pacific Journal of Optimization, 1(1):39-57, 2005.

Claudio N. Meneses, Carlos A.S. Oliveira, and Panos M. Pardalos. Optimization techniques for string selection and comparison problems in genomics. IEEE Engineering in Biology and Medicine Magazine, 24, 2005. In press.

Carlos A.S. Oliveira and Panos M. Pardalos. Construction algorithms and approximation bounds for the streaming cache placement problems in multicast networks. Cybernetics and systems Analysis, 41, 2005. In press.

Carlos A.S. Oliveira and Panos M. Pardalos. A survey of combinatorial optimization problems in multicast routing. Computers and Operations Research, 32(8):1953-1981, August 2005.

Carlos A.S. Oliveira, Panos M. Pardalos, and Tania M. Querido. A combinatorial algorithm for message scheduling on controller area networks. Int. Journal of Operations Res., 1(1), 2005. In press.

Oleg Prokopiev, Claudio N. Meneses, Carlos A.S. Oliveira, and Panos M. Pardalos. On multiple-ratio hyperbolic 0-1 programming problems. Pacific Journal of Optimization, 1(2), 2005.

Don Grundel, Carlos A.S. Oliveira, and Panos M. Pardalos. Asymptotic properties of random multidimensional assignment problems. Journal of Optimization Theory and Applications, 122(3):33-46, 2004.

Claudio N. Meneses, Z. Lu, Carlos A.S. Oliveira, and Panos M. Pardalos. Optimal solutions for the closest string problem via integer programming. INFORMS Journal on Computing, 16(4):419-429, 2004.

Carlos A.S. Oliveira and Panos M. Pardalos. Randomized parallel algorithms for the multidimensional assignment problem. Applied Numerical Mathematics, 49(1):117-133, 2004.

Ricardo Correa, Fernando Gomes, Carlos A.S. Oliveira, and Panos M. Pardalos. A parallel implementation of an asynchronous team to the point-to-point connection problem. Parallel Computing, 29(4):447-466, 2003.

Turner, W.

Earni, Shankar, W. C. Turner, "Night Set Back-Up System: Web Centric DDC Framework", accepted **Energy Engineering,** forthcoming 2005

Turner, W., Approximately 52 Editorial Letters published in **Energy Engineering** or **Strategic Planning for Energy and the Environment,** as Editor-In-Chief

Yauch, C.

Yauch, C.A., & Adkins, K. (2004). Effects of cooperative and competitive incentives on agility, quality, and speed in an experimental setting. Human Factors and Ergonomics in Manufacturing, 14(4), 403-413.

Yauch, C.A., & Steudel, H.J. (2003). Complementary use of qualitative and quantitative cultural assessment methods. Organizational Research Methods, 6(4), 465-481.

Yauch, C.A., & Steudel, H.J. (2002). Cellular manufacturing for small businesses: key cultural factors that impact the conversion process. Journal of Operations Management, 20, 593-617.

Yauch, C.A. (2000, December). A stubborn old philosophy. IIE Solutions, p. 19.

Yauch, C.A. (1999). Majoring in engineering: A study of gender differences. Journal of Women and Minorities in Science and Engineering, 5(2), 183-205.

Books (and Book Chapters) Published

Bukkapatnam, S.

S.T.S. Bukkapatnam and S. C-Y. Lu (Editors), *Proceedings of USA-China Workshop on Advanced Machine Tool Research,* NSF Report, 1999.

S.T.S. Bukkapatnam and H. Gao, "Effect of reinforcement learning on the coordination of multiagent systems," *Network Intelligence: Internet-based manufacturing (SPIE 4208),* N.M. Berry (ed), pp. 31-41, 2000.

B. Khoshnevis, H. Kwon, S.T.S. Bukkapatnam, and R. Russel, "Contour Crafting: A layered fabrication technique," In *Prototyping for Robotics and Automation*, Eds: T. Sobh and K.M. Lee, IEEE Press (In Press).

Case, K.

American Society for Quality Staff with contributions from Kenneth E. Case (as President-Elect), *Living in the Future: The Seven Key Forces*, American Society for Quality, Milwaukee, Wisconsin, October 2002.

Case, Kenneth E., "Forward" to ReVelle, Jack, *Quality Essentials: A Reference Guide from A to Z*, Quality Press, American Society for Quality, Milwaukee, Wisconsin, 2004. (invited)

DeYong, C.

DeYong, C.F. (1997). "Economic Analysis and Life Cycle Costing," Chapter 4 in: *Guide to Energy Management*, B.L. Capehart, W.C. Turner and W.J. Kennedy, Eds. Lilburn, GA: The Fairmont Press.

Kamath, M.

Prabhu, V., S. Kumara, and M. Kamath (Editors), *Scalable Enterprise Systems: An Introduction to Recent Advances*, Kluwer Academic Publishers, MA, 2003.

Sivaraman, E. and M. Kamath, "Verification of Business Process Designs using MAPS," in *The Next Wave in Computing, Optimization, and Decision, Technologies*, (B.L. Golden, S. Raghavan, E.A. Wasil, Eds.), Springer, 303-318, 2005.

Kamath, M., N. Dalal, W.J. Kolarik, A. Chaugule, and E. Sivaraman, "A review of enterprise process modeling techniques," *Scalable Enterprise Systems*, (V. Prabhu, S. Kumara, M. Kamath, Eds.), Kluwer Academic Publishers, MA, 1-32, 2003.

Kolarik, W.

Kolarik, W. J., "Problem Solving and Quality Improvement – Management and Planning Tools," Chapter in, *The Certified Quality Engineer Handbook*, 2nd Edition, R. Berger, et al. Editors, Milwaukee, WI: ASQ Press, 2001.

Kolarik, W. J., *Creating Quality: Process Design for Results*, New York, NY: McGraw-Hill, 600 pages, 1999.

Nazemetz, J.

Nazemetz, John W., editor, Engineering Design With CAD, A Pearson Custom Publication, Pearson - Prentice-Hall, Upper Saddle River, N.J., 2004.

Oliveira, C.

H.-W. Chu, J. Ferrer, S. Lim, G. Kharatishvili, and C. Oliveira, editors. Proceedings of International Conference on Computer, Communication and Control Technologies (CCCT'03), volume 5. International Institute of Informatics and Systemics (IIIS), 2003

Claudio N. Meneses, Carlos A.S. Oliveira, and Panos M. Pardalos. Mathematical programming formulations for problems in genomics and proteomics. In Data Mining and Optimization in Biomedicine. Kluwer, Dordrecht, 2005.

Carlos A.S. Oliveira. Approximation algorithms for combinatorial optimization. In C.A. Floudas and P.M. Pardalos, editors, Encyclopedia of Optimization. Kluwer Academic Publishers, 2005. To appear.

Carlos A.S. Oliveira and Panos M. Pardalos. Ad hoc networks: Optimization problems and solution methods. In Ding-Zhu Du, Maggie Cheng, and Yingshu Li, editors, Combinatorial Optimization in Communication Networks. Kluwer, Dordrecht, 2005. In press.

Carlos A.S. Oliveira, Panos M. Pardalos, and Oleg Prokopiev. Data structures and algorithms. In Encyclopedia of Computer Science and Engineering. Wiley and Sons, 2005. In press.

Carlos A.S. Oliveira, Panos M. Pardalos, and Mauricio G.C. Resende. Optimization problems in multicast tree construction. In Handbook of Optimization in Telecommunications. Kluwer, Dordrecht, 2005. To appear in the Fall.

Claudio N. Meneses, Carlos A.S. Oliveira, and Panos M. Pardalos. A branch-and-cut to the point-to-point connection problem on multicast networks. In F. Giannessi and A. Maugeri, editors, Variational Analysis and Applications, page 1084. Kluwer Academic Publishers, Dordrecht, 2004.

Carlos A.S. Oliveira, Panos M. Pardalos, and Tania M. Querido. Integer formulations for the message scheduling problem on controller area networks. In D. Grundel, R. Murphey, and P. Pardalos, editors, Theory and Algorithms for Cooperative Systems, pages 353-365. World Scientific, 2004.

Sergiy Butenko, Xiuzhen Cheng, Carlos A.S. Oliveira, and Panos M. Pardalos. A new algorithm for connected dominating sets on ad hoc networks. In S. Butenko, R. Murphey, and P. Pardalos, editors. Recent Developments in Cooperative Control and Optimization, pages 61-73. Kluwer Academic Publishers. 2003.

Pratt, D.

Pratt, D.B. "Chapter 4: Economic Analysis," Energy Management Handbook, 4th Edition, W.C. Turner, Ed., Fairmont Press, Inc., Lilburn,GA, 37-83, 2001.

Rossler, P.

K.J. Kiser and P.E. Rossler, Organizational Change: Myths and Realities, In *Applied Sociology* (W. Dubois, Editor), 2000.

P.E. Rossler and M.C. Potter (Editors), The Discipline Specific Review of Industrial Engineering. In *FE/EIT Discipline Review*, 3rd Edition, Okemos, MI: Great Lakes Press, 1999. (Chapters authored in the above book: Chapter 2: Facility Design and Location, Chapter 3: Industrial Cost Analysis (with R.A. Johnson), Chapter 5: Industrial Management, Chapter 9: Material Handling System Design, Chapter 12: Productivity Measurement, Chapter 15: Work Performance.)

Turner, W.

Turner, Wayne C., Energy Management Handbook, 5th Edition, Fairmont Press, Atlanta Georgia, 2005

Turner, Wayne C., Energy Management Handbook, 4th Edition, Fairmont Press, Lilburn Georgia, 2002

Capehart, Barney L., William J. Kennedy, Wayne C. Turner, Guide to Energy Management, Fairmont Press, Lilburn, Ga., 2003

Yauch, C.

Yauch, C.A. (Forthcoming, 2005). Incentive systems. International Encyclopedia of Ergonomics & Human Factors (2nd ed.).

Yauch, C.A., & Hariyono, H. (Forthcoming, 2005). Job rotation. International Encyclopedia of Ergonomics & Human Factors (2nd ed.)

Refereed Conference Proceedings Published

Bukkapatnam, S.

S.T.S. Bukkapatnam. "Compact nonlinear signal representation in machine tool operations," *ASME Design Engineering and Technology Conference*, DETC-VIB 8068, September 12-15. Las Vegas, NV, 1999.

S. C-Y. Lu, S.T.S. Bukkapatnam, P. Ge, and N. Wang, "Backward mapping methodology for design synthesis", *Proceedings of 1999 ASME Design Engineering Technical Conference*, DETC99/DTM-8766, September 12-15, Las Vegas, Nevada, USA, 1999.

S.T.S. Bukkapatnam and M. Fofana, "Analysis of delay differential equation model of machining dynamics," *Proceedings of Flexible Automation and Intelligent Manufacturing FAIM 2000*, pp. 145-154, College Park, Maryland, June 2000.

S.T.S. Bukkapatnam and H. Gao, "Effect of reinforcement learning on the coordination of multiagent systems," *Proceedings of SPIE Photonics East Conference*, Boston, MA, 2000.

J. Zhao, M.M. Dessouky, S.T.S. Bukkapatnam, "Distributed holding control of bus transit operations," *Proceedings of IEEE Intelligent Transportation Systems Conference*, Oakland, CA, August 2001.

M. Fofana and S.T.S. Bukkapatnam, "Hopf bifurcation in machining dynamics," *Proceedings of 2000 ASME Design Engineering Technical Conference*, Pittsburgh, PA, September 2001.

P. Ge, S. C-Y. Lu, and S.T.S. Bukkapatnam, "A direct synthesis method for early-stage parametric design of large-scale mechanical systems", *Proceedings of ASME 2002 Design Engineering Technical Conferences* DETC2002/DTM-34006, September 29 - October 2, Montreal, Canada, 2002.

R. Palanna, and S.T.S. Bukkapatnam, "Model-based tampering for improved process performance: Application to grinding of shafts," *Transactions of NAMRI/SME*, 2002 (A version published in *SME Journal of Manufacturing Processes, 2003*).

S.T.S. Bukkapatnam and S. Kumar, "Analysis of fatigue crack growth using a genetic algorithm," *International Conference On Fatigue Damage Of Structural Materials* V, 19 – 24 September 2004, Hyannis Resort, MA, USA.

S. T. S. Bukkapatnam, "Complex Nonlinear stochastic dynamics of precision grinding operations: Implications for health monitoring and control," *ICCS 2004 Conference,* Boston, MA, 2004 (submitted).

S. T. S. Bukkapatnam and D. Chang "A statistical mechanistic model of acoustic emission generation in shear zone of machining," *Transactions of NAMRI/SME*, 2005 (to appear).

Case, K.

Sivaraman, Eswar and Kenneth E. Case, "An Approach to the Construction of Mixed Model Orthogonal Designs for Screening in Industrial Experimentation," *Proceedings*, 8th Annual Industrial Engineering Research Conference, May 1999. (refereed)

Sivaraman, Eswar and Kenneth E. Case, "Mixed Model Designs for Screening Experiments," *Proceedings*, The INFORMS Fall 1999 Meeting, October, 1999. (refereed)

Sivaraman, Eswar and Kenneth E. Case, "Optimality Equations and New Rules for the Zone Control Chart," (Extended Abstract), *Proceedings*, 10th Annual Industrial Engineering Research Conference, May 2001. (refereed)

Wong, Pooi Phan, Camille F. DeYong, and Kenneth E. Case, "Analysis of the Effects of Measurement Error in Product Testing," *Proceedings*, 10th Annual Industrial Engineering Research Conference, May 2001. (refereed)

DeYong, C.

Venkitachalam, G.H.K., D.B. Pratt, C.F. DeYong, S. Morris, and M.L. Goldstein, "Forecasting and Inventory Planning for Parts with Intermittent Demand - A Case Study," Industrial Engineering Research Conference, Portland, Oregon, May, 2003, Proceedings.

DeYong, C.F., D.B. Pratt, S. Salman, D. Yemenu and S. Morris, (2001) "An Integrated Approach to Technology Forecasting and Assessment: Research to Support Counterterrorism," Industrial Engineering Research Conference, Dallas, TX, May 2001, Proceedings.

McCombs, E.L. and C.F. DeYong (2001), "A Study of the Behavior of the Beta Probability Distribution Applied to Project Risk," Industrial Engineering Research Conference, Dallas, TX, May 2001 Proceedings.

Wong, P.P, K.E. Case and C.F. DeYong (2001). "Analysis of the Effects of Measurement Error in Product Testing," Industrial Engineering Research Conference, Dallas, TX, May 2001 Proceedings.

McCombs, E. and C.F. DeYong, "A Hands-On Approach to Teaching Undergraduate Engineering Students the Concept of Economic Project Risk," American Society for Engineering Education National Conference, Albuquerque, NM, June, 2001. Proceedings.

DeYong, C.F. and S.D. Bilbeisi (1999). "Reaching Engineering and Architecture Career Heights: A Pre-College Program To Interest Young Women in Engineering, Architecture and Technology," American Society for Engineering Education National Conference. Charlotte, NC, June 21-23, 1999. Proceedings.

DeYong, C.F. (1999). "Development of a Customer Satisfaction Measurement System for the US Army Materiel Systems Analysis Activity," Fourth Annual International Conference on Industrial Engineering Applications and Practice, San Antonio, Texas, November 18-20, 1999. Proceedings.

DeYong, C.F. and K.E. Case (1997). "Operationalizing Customer Satisfaction Dimensions," 51st Annual Quality Congress, American Society for Quality *Proceedings*.

DeYong, C.F., K.E. Case and J.E. Shamblin (1997). "Identifying and Defining Customer Satisfaction Dimensions," Sixth International Conference on Productivity and Quality Research *Proceedings*.

DeYong, C. F. and K.E. Case (1996). "Linking Customer Satisfaction Dimensions with Process Performance Metrics," First Annual Industrial Engineering Applications and Practice Conference *Proceedings*.

Ingalls, R.

Mahajan, P., and R. G. Ingalls, Evaluation of Methods Used to Detect Warm-Up Period in Steady State Simulation, *Proceedings of the 2004 Winter Simulation Conference*, Washington, D.C., December, 2004.

Sehwail, L. and R. G. Ingalls, The Truth about Online Reverse Auctions, *Proceedings of the 2004 Industrial Engineering Research Conference*, Houston, Texas, May 2004.

Sehwail, L. and R. G. Ingalls, Modeling the Value Proposition of the E-Marketplace vs. Direct Connection, *Proceedings of the 2004 Industrial Engineering Research Conference*, Houston, Texas, May 2004.

Krishnamoorithy, A., M. Kamath, R. G. Ingalls, Development of a Framework for Supply Chain Research, *Proceedings of the 2004 Industrial Engineering Research Conference*, Houston, Texas, May 2004.

Helal. A., K. Wegley, and R. G. Ingalls, Inventory Lot Sizing Techniques for the Semiconductor and Pharmaceutical Industries, *Proceedings of the 2004 Industrial Engineering Research Conference*, Houston, Texas, May 2004.

Shen, G., P. S. Pulat, N. Kumar, R. G. Ingalls, M. Kamath, Y. Leow, K. Ayodhiramanujan, A Regional Freight Movement Model: Concepts and Formulations, *Proceedings of the 2004 Industrial Engineering Research Conference*, Houston, Texas, May 2004.

Kumar, N., P. S. Pulat, G. Shen, M. Kamath, R. G. Ingalls, Database and Software Modeling in Freight Planning, *Proceedings of the 2004 Industrial Engineering Research Conference*, Houston, Texas, May 2004.

Brunner, D.T., J.O. Hendrickson, R.G. Ingalls, M.S. Mannivannan, B.L. Nelson and C. Schiess, The Future of The Winter Simulation Conference, Panel Discussion. *Proceedings of the 2003 Winter Simulation Conference*, New Orleans, Louisiana, December 7-10, 2003.

Ingalls, R.G. and B.L. Foote, Reducing The Bullwhip Effect In Supply Chains With Control-Based Forecasting, *Proceedings of the 2003 Industrial Engineering Research Conference*, Portland, Oregon, May 18-20, 2003.

Ingalls, R.G., Optimal Supply Chain Strategic Inventory Positioning for Serial Supply Chains. *Proceedings of the 2003 Industrial Engineering Research Conference*, Portland, Oregon, May 18-20, 2003.

Sehwail, L., H. Govind, R.G. Ingalls, Success Factors for e-Procurement Marketplaces. *Proceedings of the 2003 Industrial Engineering Research Conference*, Portland, Oregon, May 18-20, 2003.

Ingalls, R.G., Introduction to Simulation. *Proceedings of the 2002 Winter Simulation Conference,* San Diego, California, Dec. 8-11, 2002.

Ingalls, R.G., Introduction to Simulation. In: Peters, B.A., Smith, J. S., Medeiros, D.J., Rohrer, M.W., (eds) *Proceedings of the 2001 Winter Simulation Conference*, Dec. 9-12, 2001, Arlington, Virginia, pp. 7-16.

Ingalls, R.G., J.N. Nazemetz, Designing The Support Logistics For The FAA ACE-IDS System. In: Peters, B.A., Smith, J. S., Medeiros, D.J., Rohrer, M.W., (eds) *Proceedings of the 2001 Winter Simulation Conference*, Dec. 9-12, 2001, Arlington, Virginia, pp. 1117-1122.

Ingalls, R.G. D.J. Morrice. PERT Scheduling With Resources Using Qualitative Simulation Graphs. In: Joines, J.A., Barton, R.R., Kang, K., Fishwick, P.A., (eds) *Proceedings of the 2000 Winter Simulation Conference*, Dec. 10-13, 2000, Orlando, Florida, pp. 362-370.

Ingalls, R.G, C. Kasales. CSCAT: Compaq Supply Chain Analysis Tool. In: Farrington, P.A., Nembhard, H.B., Sturrock, D.T., Evans, G.W., (eds) *Proceedings of the 1999 Winter Simulation Conference*, Dec. 5-8, 1999, Phoenix, Arizona, pp. 1201-1206.

Ingalls, R.G., Banks, J. (Chair). What Does Industry Need From Simulation Vendors in Y2K And After: A Panel Discussion. In: Farrington, P.A., Nembhard, H.B., Sturrock, D.T., Evans, G.W., (eds) *Proceedings of the 1999 Winter Simulation Conference*, Dec. 5-8, 1999, Phoenix, Arizona, pp. 1501-1508.

Kamath, M.

Gupta, A., R. Sharda, R.A. Greve, and M. Kamath, "An exploratory analysis of email processing strategies," in *Proceedings of the 22nd Annual Decision Sciences Meeting,* Boston, MA, 7671-7676, 2004.

Chinnaswamy, M., M. Kamath, and R, Greve, "Queueing models for analyzing contact center operations," in *Proceedings of 2004 Industrial Engineering Research Conference*, 2004.

Kumar, N., S. Pulat, G. Shen, R. Ingalls, and M. Kamath, "Database and software application in freight planning," in *Proceedings of 2004 Industrial Engineering Research Conference,* 2004.

Pulat, S., G. Shen, N. Kumar, R. Ingalls, M. Kamath, Y. Leow, and K. Ayodhiramanujan, "Development of a freight movement model for Oklahoma," in *Proceedings of 2004 Industrial Engineering Research Conference*, 2004.

Srivathsan, S., K. Ayodhiramanujan, M. Kamath, and A. Krishnamoorthy, "Queueing models for supply chain networks," in *Proceedings of 2004 Industrial Engineering Research Conference,* 2004.

Kamath, M. and J. Mize, "Impact of Major Driving Forces on IE Education and Practice," in *Proceedings of 2003 Industrial Engineering Research Conference*, 2003.

Kamath, M. "Performance Analysis of Supply Chain Networks," in *Proceedings of the International Workshop on IT-Enabled Manufacturing, Logistics and Supply Chain Management*, Indian Institute of Science, Bangalore, 100-108, 2003.

Kamath, M., N. Dalal, and R. Chinnasamy, "The application of XML-based markup languages in enterprise process modeling," *Industrial Engineering Research Conference (IERC) 2002 CD_ROM Proceedings*, 2003.

Sivaraman, E., and M. Kamath, "On the use of Petri nets for business process modeling," *Industrial Engineering Research Conference (IERC) 2002 CD-ROM Proceedings*, 2002.

Kamath, M., N. Dalal, W. Kolarik, A. Lau, E. Sivaraman, A. Chaugule, S. Choudhury, A. Gupta, and R. Channahalli, "An integrated framework for process and performance modeling of next-generation enterprise systems: design and development issues" *Proceedings of the University Synergy Program (USP) Conference*, 2002.

Kamath, M., N. Dalal, W. Kolarik, A. Chaugule, E. Sivaraman, and A. Lau, "Process-modeling techniques for enterprise analysis and design: a comparative evaluation," *IERC 2001 CD-ROM Proceedings*, 2001.

Krishnamoorthy, B. and M. Kamath, "Designing flexible shop-floor control systems," *IERC 2001 CD-ROM Proceedings*, 2001.

Dechert, J.D. and M. Kamath, "Correlated arrivals in queueing models," *Industrial Engineering Research '99 Conference Proceedings*, 1999.

Krishnamoorthy, B. and M. Kamath, "A new approach to the design of FMS control architectures," *Industrial Engineering Research '99 Conference Proceedings*, 1999.

Ramachandran, P. and M. Kamath, "Control of manufacturing systems using Petri nets," in *Industrial Engineering Research '99 Conference Proceedings*, 1999.

Kolarik, W.

Kolarik, W. J., S. Earni, and J. Taylor, "Process Control Concepts for Integrating Quality and Productivity," *IIE Research Conference 03 Proceedings*, CD, 2003.

Kolarik, W. J., "A Process Design and Integration Theory." *IIE Research 02 Proceedings*, CD, 2002.

Kamath, M, N. Dalal, W. Kolarik, A. Chaugule, and E. Sivaram, "Process-Modeling Techniques for Enterprise Analysis and Design: A Comparative Evaluation," *IIE Research 01 Proceedings*, CD, 2001.

Kolarik, W. J., S. Lu, and H.Lu, "Intelligent Failure Prediction and Fault Diagnosis Systems," *Proceedings – The International Conference on Frontiers of Design and Manufacturing*, Hangzhou, China, 2000.

Kolarik, W. J., H. Lu, and S. Lu, "Real-Time Conditional Reliability Assessment with On-Line Data Acquisition," *Proceedings – The Fourth International Conference on Electronic Measurement and Instruments*, Harbin, China, 1999.

Sanders, M., S. Patro, and W. Kolarik, "Effective Application of ERP Systems in Small Manufacturing Enterprises," *Baan Brothers Foundation 2nd Roundtable Proceedings*, Utrecht, The Netherlands, pp. 151-155, 1999.

Kolarik, W. J., J. Woldstad, H. Lu, and S. Lu "Human Reliability Performance Metrics and Modeling Strategies," *IIE Research 99 Proceedings*, CD, 1999.

Nazemetz, J.

Nazemetz, J.W., E.L. McCombs, and D.B. Pratt, "Efficient Capture of Content for Delivery in Multiple Presentation Modes Without Killing Yourself or the Budget," ," forthcoming in the Proceedings of the American Society of Engineering Education, June 2001.

Oliveira, C.

Carlos A.S. Oliveira and Panos M. Pardalos. Optimization techniques for network routing. In Proc. of 3rd ACS/IEEE International Conference on Computer Systems and Applications - (AICCSA-05), January 3-6, 2005, Cairo, Egypt, 2005.

Clayton W. Commander, Sergiy I. Butenko, Panos M. Pardalos, and Carlos A.S. Oliveira. Reactive GRASP with path relinking for the broadcast scheduling problem. In Proceedings of the 40th Annual International Telemetry Conference, pages 792-800, 2004.

Carlos A.S. Oliveira and Panos M. Pardalos. Algorithms for the streaming cache placement problem on multicast networks. In Seventh INFORMS Telecommunications Conference, pages 47-49. INFORMS, 2004. (ITC'04), March 7-10, 2004, Boca Raton, Florida.

Carlos A.S. Oliveira and Panos M. Pardalos. A distributed optimization algorithm for power control in wireless ad hoc networks. In Proc. 18th International Parallel and Distributed Processing Symposium (IPDPS'04), volume 7: 6th Workshop on Advances in Parallel and Distributed Computational Models (WAPDCM'04), page 177. IEEE Computer Society, 2004. April 26th 2004, Santa Fe, New Mexico.

Carlos A.S. Oliveira and Panos M. Pardalos. Network flow algorithm for the longest common subsequence problem. In Proc. of I International Symposium on Mathematical and Computational Biology, Ilheus, Brazil, 2004. (BIOMAT'04), Nov 27-Dec 1.

Carlos A.S. Oliveira, Panos M. Pardalos, and M.G.C. Resende. GRASP with path-relinking for the quadratic assignment problem. In Celso C. Ribeiro and Simone L. Martins, editors, Proc. of Third Workshop on Efficient and Experimental Algorithms (WEA'04), Angra dos Reis, Rio de Janeiro, Brazil, May 25-28, volume 3059 of Lecture Notes of Computer Science, pages 356-368. Springer-Verlag, 2004.

Sergiy Butenko, Carlos A.S. Oliveira, and Panos M. Pardalos. A new algorithm for connected dominating sets on ad hoc networks. In H.-W. Chu, J. Ferrer, S. Lim, G. Kharatishvili, and C. Oliveira, editors, Proc. of Int. Conf. on Computer, Communication and Control Technologies (CCCT'03), volume 5, pages 39-44. International Institute of Informatics and Systemics (IIIS), 2003. Orlando, Florida, July 31, 2003

Carlos A.S. Oliveira, David Paolini, and Panos M. Pardalos. A randomized algorithm for minimizing user disturbance due to changes in cellular technology. In H.-W. Chu, J. Ferrer, S. Lim, G. Kharatishvili, and C. Oliveira, editors, Proc. of Int. Conf. on Computer, Communication and Control Technologies (CCCT'03), volume 5, pages 45-50. International Institute of Informatics and Systemics (IIIS), 2003. Orlando, Florida, July 31, 2003.

Carlos A.S. Oliveira, Panos M. Pardalos, and M.G.C. Resende. GRASP with path-relinking for the QAP. In 5th Metaheuristics International Conference, pages 57.1-57.6. MIC, 2003. (MIC'03), August 25-28, Kyoto, Japan.

Fernando C. Gomes, Panos M. Pardalos, Carlos A.S. Oliveira, and Mauricio G.C. Resende. Reactive GRASP with path relinking for channel assignment in mobile phone networks. In Proceedings of the 5th International Workshop on Discrete Algorithms and Methods for Mobile Computing and Communications (DIALM), pages 60-67. ACM Press, 2001. Rome, July 21, 2001.

Pratt, D.

Baheti, R. and D.B. Pratt, "Agility in the Service Sector," Proceedings of the Industrial Engineering Research Conference 2004.

DeYong, C.F., D.B. Pratt, S. Salman, D. Yemenu and S. Morris, (2001) "An Integrated Approach to Technology Forecasting and Assessment: Research to Support Counterterrorism," Proceedings of the Industrial Engineering Research Conference, May 2001.

Kwon, A.J. and D.B. Pratt, "Investigation of a Neural Network Methodology to Predict Transient Performance in an FMS", Proceedings of the Industrial Engineering Research Conference 2002.

McCombs, E.L. and D.B. Pratt, "Postponed Condition-Based Maintenance Versus As-Available Preventative Maintenance", Proceedings of the Industrial Engineering Research Conference 2002.

McCombs, E.L. and D.B. Pratt, "Decision Rule Model to Predict the Economically Preferred Maintenance Strategy", Proceedings of the Industrial Engineering Research Conference 2004.

Morris, S.A. and D.B. Pratt, "Use of the NSRL Family of Substitution Curves to Model Incremental and Discontinuous Technology Replacement," Proceedings of the International Symposium of Forecasting 2001.

Nazemetz, J.W., E.L. McCombs, and D.B. Pratt, "Efficient Capture of Content for Delivery in Multiple Presentation Modes Without Killing Yourself or the Budget," ," forthcoming in the Proceedings of the American Society of Engineering Education, June 2001.

Venkitachalam, G.H.K., D.B. Pratt, C.F. DeYong, S. Morris, and M.L. Goldstein, "Forecasting and Inventory Planning for Parts with Intermittent Demand - A Case Study" Proceedings of the Industrial Engineering Research Conference 2003.

Rossler, P.

Rossler, P.E. and Clark, D.R., Teaching Lean Work Design in a Traditional Methods Course, *Proceedings of the Tenth IE Research Conference,* May, 2001.

Rossler, P. E., In search of implementation. American Society of Engineering Management Conference, Tampa, FL., October 2002.

Rossler, P. E. and K. J. Kiser. Moving beyond installation to effective use of ERP systems. Institute of Industrial Engineers Annual Conference *Proceedings*, Orlando, FL., May 2002.

Rossler, P.E., Better Implementation Plans for Change, International Industrial Engineering Conference *Proceedings*, May, 2001.

Yauch, C.

Krishnamurthy, R., & Yauch, C.A. (2004). Defining the boundaries of a corporate leagile infrastructure. 2004 Industrial Engineering Research Conference, Houston, TX.

Yauch, C.A. (2004). Measuring agility: Success in a turbulent environment. Proceedings of the 2004 NSF Design, Service, and Manufacturing Grantees and Research Conference, Dallas, TX.

Yauch, C.A., Caniglia, B., & Hariyono, H. (2003). Examining inter-group cooperation, competition, and conflict. In H. Luczak & K. J. Zink (Eds.), Proceedings of the Human Factors in Organizational Design and Management VII Conference, Aachen, Germany, pp. 115-120.

Yauch, C.A. (2003). Understanding worker resistance to job rotation. 2003 Industrial Engineering Research Conference, Portland, OR.

Yauch, C.A. (2003). Panel session on NSF-Innovation & Organizational Change Program. 2003 Industrial Engineering Research Conference, Portland, OR.

Yauch, C.A., & Kamath, M. (2003). Achieving fast and flexible manufacturing. Tulsa Regional Manufacturing Technology and Industrial Expo, Tulsa, OK.

Yauch, C.A., & Adkins, K. (2003). Effects of cooperative and competitive incentives on agility, quality, and completion time in an experimental setting. Proceedings of the 2003 NSF Design, Service, and Manufacturing Grantees and Research Conference, Birmingham, AL.

Yauch, C.A., & Athale, A.J. (2002). Increasing manufacturing competency with a "dirt-cheap" sand casting lab. Proceedings of the 2002 ASEE Conference, Montreal, Quebec (peer-reviewed).

Yauch, C.A. (2001). Long lead times and a whole lot more: A study of contracting for aerospace engineering services. Quick Response Manufacturing Conference, October, 2001, Madison, WI.

Yauch, C.A., & Jones, F.H. (2001). Learning from freshman perspectives: A two-dimensional approach to increasing student satisfaction. Proceedings of the 2001 ASEE Conference, Albuquerque, NM (peer-reviewed).

Yauch, C.A. (2000). Culture shock: The impact of organizational culture on QRM implementation. Proceedings of the Quick Response Manufacturing 2000 Conference, June, 2000, Madison, WI, (SME Technical Paper MM00-157).

Yauch, C.A. (1999). Organizational culture and its implications for quick response manufacturing. Proceedings of the 1999 Industrial Engineering Research Conference, Phoenix, AZ.

Other Creative Activities (description)

Bukkapatnam, S.

Bukkapatnam, S., RFID and RF Sensing Laboratory for complex systems (in progress) OSU's ATRC.

Case, K.

Case, K., "Quality Still Matters – For Everyone," Ohio Department of Education, Columbus, Ohio, August 2001.

Case, K., "Strengthen Your Competitive Position With Satisfied Employees," *The Wall Street Journal*, Northwestern Mutual Financial Network, and American Society for Quality, Carmel, Indiana, March 2002.

Case, K., "The State of Quality in Education: Results of Landmark Research Sponsored by ASQ, the Education Division and Koalaty Kid," National Quality In Education Conference, Columbus, Ohio, September 2002.

Case, K., "The Future of Quality and Its Implications," ASQ Southeastern Quality Conference, Atlanta, Georgia, October 2002.

Case, K., "Strengthen Your Competitive Position With Satisfied Employees," *The Wall Street Journal*, Northwestern Mutual Financial Network, and American Society for Quality, Nashville, Tennessee, October 2002.

Case, K., "LEANing on Quality," Keynote Address, Northern Illinois Quality Conference, American Society for Quality Control, Chicago, Illinois, September 2003.

Case, K., "Pull vs. Push: Some Thoughts on Developing Diversity in a Large Association," Keynote Address, ASQ Toronto Annual Quality Forum, Toronto, Ontario, Canada, October 2003.

Case, K., "Creating Value Through Quality and Innovation," Luncheon Address, Golden Spike Section Fall Symposium, American Society for Quality, Ogden, Utah, October 2003.

Case, K., "Organizational Quality," Keynote Address, Universidad de Monterrey, Monterrey Student Branch, American Society for Quality, Monterrey, Mexico, January 2004.

Case, K., Enhancing Competitiveness Through Quality of Management: Learning from the Past, Present, and Future of Quality," 199th CEO Breakfast, Korean Standards Association, Seoul, Korea, November 2004.

Case, K., "Future Directions in Quality and the Important Role of NQ(M)A Criteria," to 30th Annual Korean National Quality Management Award Convention, Seoul, Korea, November 2004.

Case, K., "The Future of Quality: A Top Ten List," to 2005 Quality Management Division, American Society for Quality, Orlando, Florida, February 2005.

Case, K., Leading change in American Society for Quality strategic direction, membership model for individuals and organizations, and governance as Chairman of the Board (2004-5), President (2003-4), President-Elect (2002-3), Treasurer (2001-2).

Ingalls, R.

Ingalls, R., Expert Panel Member (Governor's Appointment), Oklahoma's Economic Development Generating Excellence (EDGE) Program, Infrastructure and Logistics Committee, 2003.

Ingalls, R., Proceedings Editor, *Proceedings of the 2004 Winter Simulation Conference.*

Kolarik, W.

Kolarik, W. J., "Process Thinking, Thinking Process," Keynote lecture at the USP 2002 Conference, Netherlands, November 2002.

Pratt, D.

Pratt, D.B., "Basic Concepts of Production Control," CD Series Manual, OSU Engineering Extension, 2002.

Turner, W.

Editor, **Energy Engineering,** Association of Energy Engineers, Atlanta Georgia, 1999 – Present

Editor, **Strategic Planning for Energy and the Environment,** Association of Energy Engineers, Atlanta, Georgia, 2002- Present

Co-Lead Instructor for **Comprehensive Energy Management,** a 5-day Association of Energy Engineers Certification Course, Taught 75 times in 6 different countries

Yauch, C.

Yauch, C., Workshop on NSF Proposal Review, Co-leader with Toni Doolen, 2004 Industrial Engineering Research Conference, Houston, TX.

Yauch, C. and W. Lewis, Design for Manufacturing Laboratory development, including the installation of the Haas Technical Center (CNC machining and turning laboratory), 2003.

Yauch, C., "Saving the castaways: The ultimate case for performance incentives." Workshop presented at the Quick Response Manufacturing Center seminar, December, 1999, Madison, WI.

Yaruch, C., "Cellular and Quick Response Manufacturing," Invited 1-day seminar at Purdue University-Calumet, February 6, 2002