Six More Years!

By Jeffrey Liker, Newsletter Editor and Professor, IOE

A lot has happened since the Winter, 1999 Newsletter. A highlight for IOE was that we were accredited for the maximum six years by ABET (accredits engineering schools). ABET used to have a long list of things to teach for engineering schools, with some specific requirements for each field like IOE. For this recent accreditation we decided to apply under a new system they recently rolled out. In this case a system similar to a Total Quality Management program was used. As a department we needed to define our learning objectives for our students and how we will measure these. Then we had to develop the measures and demonstrate we were beginning to use them for continuous improvement.

We now have sympathy for all of you in industry who work for service organizations and ask how to measure your effectiveness. Some of us may have given you glib responses in the past but we learned first hand what a challenge it is.

An important part of the evaluation was whether we used constituent input to develop our mission statement and learning objectives. We involved alumni through our external advisory board and our Alumni Academy as well as held focus groups for students. ABET required a number of learning objectives in basic math and science knowledge and some innovative objectives like learning to work as a team, learning professional ethics, and learning about environmental impacts. One thing you learn about standards like ISO 9000 is do not promise more than you need to because you will be held to it. Well we did not follow this advice. We came up with additional skill objectives for IOE:

1. Human Resource Management (Social) Skills (e.g., manage people, understand diversity, change management, etc.)
2. Business Management Skills (e.g., global management, business law, engineering economy, etc.)
3. Personal Management Skills (e.g., goal setting, time management, lifelong learning skills)
4. Macro Analysis (e.g., problem definition, designing products and processes)
5. Critical Thinking (e.g.,

(Continued on page 2)
Greetings to all IOE alumni and friends! We are reaching the end of the academic year, and I have found my new position as chair to be both challenging and rewarding. The caliber and professionalism of our students, faculty, and staff make me proud to represent IOE locally and at professional meetings across the country.

Our graduate and undergraduate programs are ranked #2 in the nation and we continue to be a popular department of choice with approximately 550 IOE undergraduates - truly the best and the brightest of Michigan Engineers! For example, the president, vice president, and secretary of the (graduating) Class of 2001E are all from IOE. In addition, you can imagine how pleased I was at the College of Engineering's Graduation Exercises to discover that all three student speakers were from IOE.

As described in Faculty Focus, the faculty continue to excel in all aspects of their work. Among the special honors this year were the awarding of the “Herrick Professor of Manufacturing” endowed professorship to Steve Pollock and the IOE Award for Outstanding Accomplishment to Chip White.

Last, but not least, I would like to recognize our dedicated and loyal staff for their commitment to meeting the needs of students and faculty and making the department run so smoothly. We are extremely proud that our undergraduate student advisor, Pam Linderman, was honored with the College of Engineering’s Excellence in Staff Service Award.

These are exciting and challenging times for educators. The rapid advancements in technology have had, and will continue to have, a dramatic impact on the way we do business. Many of you may be aware that MIT recently announced their intention to make nearly all of their course materials available free on the World Wide Web. Their goal is to support education worldwide, including innovations in the process of teaching and learning itself. The University of Michigan has joined fathom.com, a consortium of prestigious institutions. Fathom's primary goal is to open the enormous intellectual resources of these institutions to Internet users. The College of Engineering is working with Shanghai Jiao Tong University to develop undergraduate and graduate courses in industrial (and mechanical) engineering based on the Michigan Engineering model. This will change how China educates its future engineers. These three examples clearly illustrate the forces of technology and globalization currently reshaping education.

We all know that change is here to stay. I’m convinced, however, that one thing will never change: the significance of the Michigan experience! In my travels across the country and around the world, I have met a number of you - loyal and enthusiastic alumni who couldn’t wait to congratulate me and to tell me about their wonderful experience at Michigan - praise for the faculty and staff, the value of IOE course work, and/or warm memories of extracurricular activities. After my first year, I understand this pride and am pleased to be part of this tradition. You, our loyal alumni, are part of an incredible legacy. Please visit our alumni web page, http://ioe.engin.umich.edu/alumni.html to update your information. I’d also be delighted to hear from you regarding any suggestions you have for our future. (E-mail: seiford@umich.edu)

(Continued from page 1, Six More Years!)
The University of Michigan College of Engineering Alumni Society awarded John A. Muckstadt the Industrial and Operations Engineering Alumni Society Merit Award at the College’s annual Alumni Society Awards Dinner held on October 13, 2000.

The Alumni Society Merit Awards were established to honor distinguished alumni who personify the College’s tradition of excellence and who have had continuing impact on their fields. The Award is given to one alumnus from each of the eleven academic departments within the College. Recipients are selected by the departmental committees whose members are chosen and headed by the department chair.

John A. Muckstadt studied at the University of Rochester for the A.B. degree in Mathematics and at the University of Michigan for the M.S. in Industrial Administration, the M.A. in Mathematics, and the Ph.D., granted in 1966, in Industrial Engineering. He joined the Cornell faculty in 1974 after twelve years of active military service as a faculty member of the Air Force Institute of Technology and an operations research analyst at the Air Force Logistics Command Headquarters.

Dr. Muckstadt has been a visiting professor at the Université Catholique de Louvain, Belgium (1980), the Katholieke Universiteit, Leuven, Belgium (1981-82), and the University of Michigan (1987). At Cornell he has served as the chairman of the Graduate Professional Programs Committee and was the founding director of the Cornell Manufacturing Engineering and Productivity Program (COMEPP), which is now the Center for Manufacturing Enterprise. Dr. Muckstadt was also the director of the School of Operations Research and Industrial Engineering at Cornell University from 1987 to 1996. Currently, he is conducting research in manufacturing logistics and inventory control. He has written more than fifty papers on these subjects.

An associate editor of four scholarly journals and a consultant to many corporations, Muckstadt is a member of the Institute for Operations Research and the Management Sciences, and the Institute of Industrial Engineers. He has served as a consultant to numerous industrial organizations, including the Chicago Pneumatic Tool Company, IBM, Bell Atlantic, GM, RAND corporation, TRINOVA Corporation, SAS Airlines, GE, and Xerox, as well as to several government agencies.

Dr. Muckstadt received an IIE Transactions Award in the area of Best Paper in Scheduling and Logistics Focus Issue for his coauthored paper with Dr. Charles R. Sox, “Optimization-based planning for the stochastic lot-scheduling problem.” In 2000, he was awarded the College of Engineering Excellence in Teaching Awards from Cornell University. In the same year, Dr. Muckstadt was named the Acheson/Laibe Professor of Business Management and Leadership Studies by the Cornell University Board of Trustees.

Dr. John Muckstadt (right) received the 2000 IOE Alumni Society Merit Award from Stephen W. Director (left), Robert J. Vlasic Dean of Engineering, along with Lawrence M. Seiford (far right), IOE Department Chair, and Leslie L. Loomans (far left), Chair of Engineering Alumni Society Board of Governors.
Result of 1999 College of Engineering Alumni Survey

PART I. Background
1. What major(s) did you receive your undergraduate degree in?

<table>
<thead>
<tr>
<th>Major</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace Engineering</td>
<td>0.6</td>
</tr>
<tr>
<td>Atmospheric, Oceanic &amp; Space Sciences</td>
<td>0.0</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>0.5</td>
</tr>
<tr>
<td>Civil and Environmental Engineering</td>
<td>0.5</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>0.4</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>1.4</td>
</tr>
<tr>
<td>Engineering Physics</td>
<td>0.2</td>
</tr>
<tr>
<td>Industrial and Operations Engineering</td>
<td>81.8</td>
</tr>
<tr>
<td>Materials Science and Engineering</td>
<td>0.5</td>
</tr>
<tr>
<td>Mechanical Engineering and Applied Mechanics</td>
<td>6.9</td>
</tr>
<tr>
<td>Naval Architecture and Marine Engineering</td>
<td>0.2</td>
</tr>
<tr>
<td>Nuclear Engineering and Radiological Sciences</td>
<td>0.0</td>
</tr>
<tr>
<td>No Response</td>
<td>11.0</td>
</tr>
</tbody>
</table>

2. Did you enter the U-M College of Engineering as a:

<table>
<thead>
<tr>
<th>Category</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>First year student</td>
<td>70.1</td>
</tr>
<tr>
<td>Transfer student from a two-year college</td>
<td>4.5</td>
</tr>
<tr>
<td>No Response</td>
<td>6.8</td>
</tr>
<tr>
<td>Transfer student from a four-year college</td>
<td>11.3</td>
</tr>
<tr>
<td>Transfer student from other U-M school or college</td>
<td>7.3</td>
</tr>
</tbody>
</table>

3. A. What degrees did you get from IOE at University of Michigan (check all that apply):

<table>
<thead>
<tr>
<th>Degree</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelors</td>
<td>79.2</td>
</tr>
<tr>
<td>M.S.</td>
<td>21.4</td>
</tr>
<tr>
<td>M.Eng.</td>
<td>5.2</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>5.0</td>
</tr>
</tbody>
</table>

B. What advanced degrees do you hold?

<table>
<thead>
<tr>
<th>Degree</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd B.S.</td>
<td>1.3</td>
</tr>
<tr>
<td>M.S.</td>
<td>20.5</td>
</tr>
<tr>
<td>M.Eng.</td>
<td>0.8</td>
</tr>
<tr>
<td>Ph.D. (non-Engineering)</td>
<td>3.6</td>
</tr>
<tr>
<td>J.D. (Law)</td>
<td>8.6</td>
</tr>
<tr>
<td>Masters (non-Engineering)</td>
<td>4.1</td>
</tr>
<tr>
<td>M.D.</td>
<td>5.8</td>
</tr>
<tr>
<td>Ph.D. (Engineering)</td>
<td>5.0</td>
</tr>
</tbody>
</table>

4. What is your gender? 20.5% Female 78.9% Male 0.6% No Response

5. If you are an U.S. citizen or Permanent Resident, please mark the one race or ethnicity which you think applies to you best (optional):

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American/Black (not of Hispanic origin)</td>
<td>2.3</td>
</tr>
<tr>
<td>Asian or Pacific Islander (includes the Indian sub-continent)</td>
<td>4.6</td>
</tr>
<tr>
<td>American Indian or Alaskan Native</td>
<td>0.0</td>
</tr>
<tr>
<td>Hispanic/Latino(a) (Spanish culture or origin, regardless of race)</td>
<td>1.7</td>
</tr>
<tr>
<td>White (persons not of Hispanic origin, having origins in any of the original peoples of Europe, North Africa, or the Middle East)</td>
<td>85.7</td>
</tr>
<tr>
<td>Race not included above</td>
<td>1.2</td>
</tr>
<tr>
<td>No Response</td>
<td>4.5</td>
</tr>
</tbody>
</table>
7. What type of organization do you work for? (check the one that is most appropriate)
   - 1.5 aerospace
   - 2.0 electronics
   - 0.7 public utility
   - 16.2 automotive
   - 3.9 engineering consulting firm
   - 0.4 elementary/secondary school
   - 1.3 chemical/petroleum
   - 3.9 financial firm
   - 1.1 transportation firm
   - 1.3 communications firm
   - 0.7 food production/processing
   - 4.4 university or college
   - 2.6 computer hardware
   - 2.1 government agency or lab
   - 18.2 other
   - 4.4 food production/processing
   - 5.5 health-related firm/public utility
   - 8.9 currently not employed
   - 2.5 consumer products
   - 9.2 management consulting firm
   - 9.2 no response

8. A. How satisfied were you with the career services offered by the College in terms of how helpful they were to you as an undergraduate? AVERAGE = 3.6
   - 5 Very satisfied
   - 4 Satisfied
   - 3 Neutral
   - 2 Somewhat dissatisfied
   - 1 Dissatisfied

   B. How satisfied were you with the career services offered by the College in terms of how helpful they were to you as a graduate student? AVERAGE = 3.3
   - 5 Very satisfied
   - 4 Satisfied
   - 3 Neutral
   - 2 Somewhat dissatisfied
   - 1 Dissatisfied

9. What is your job title/level? (check the one that is most appropriate)
   - 1.8 software developer
   - 21.0 mid-level manager
   - 7.2 systems analyst/engineer
   - 0.7 designer
   - 21.5 corporate executive
   - 3.7 supervisor of small group
   - 0.9 graduate student
   - 6.6 marketing/sales manager
   - 10.7 consulting engineer
   - 3.6 faculty member
   - 1.3 researcher
   - 0.8 doctor
   - 0.3 elementary/secondary teacher
   - 7.6 manufacturing/process engineer
   - 2.2 lawyer
   - 10.1 no response

10. In what income range does your annual salary (gross) fall? AVERAGE = $92,000
    67% of the responses falls within the range of $41,000 to $160,000

11. Overall, how satisfied are you with your choice of career? AVERAGE = 4.3
    - 5 Very satisfied
    - 4 Satisfied
    - 3 Neutral
    - 2 Somewhat dissatisfied
    - 1 Dissatisfied

12. How many different companies/employers have you worked for since the receipt of your B.S. degree from the U-M College of Engineering? AVERAGE = 2.75
    67% of the responses falls within the range of 1.1 to 4.4 jobs

PART II. Undergraduate Education (Please answer only if you received a U.M. IOE UNDERGRADUATE degree)
13. Please rate how important the following competencies and attitudes have been to you in your professional experience and how well you feel the undergraduate program at the University of Michigan prepared you in these areas?
   Circle the appropriate number for A & B using the following scales:
   A: 5=always necessary  B: 5=excellent preparation
   4=often useful  4=good preparation
   3=useful  3=some preparation
   2=rarely useful  2=slight preparation
   1=never used, needed  1=no preparation
###PART III. GRADUATE EDUCATION (Please answer only if you received a U.M. IOE GRADUATE degree)

Please rate how important the following competencies and attitudes have been to you in your professional experience and how well you feel the GRADUATE program at the University of Michigan prepared you in these areas?

**Circle the appropriate number for A & B using the following scales:**

- **A:** 5=always necessary
- **B:** 5=excellent preparation
- 4=often useful
- 3=useful
- 2=rarely useful
- 1=never used, needed

<table>
<thead>
<tr>
<th>Competency</th>
<th>A: Importance (Avg.)</th>
<th>B: U-M Preparation (Avg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math, science and engineering skills</td>
<td>3.9</td>
<td>4.1</td>
</tr>
<tr>
<td>Ability to design and conduct experiments</td>
<td>3.1</td>
<td>3.4</td>
</tr>
<tr>
<td>Ability to design a system, component or process</td>
<td>3.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Ability to function on a team</td>
<td>4.5</td>
<td>3.1</td>
</tr>
<tr>
<td>Engineering problem-solving skills</td>
<td>4.2</td>
<td>3.9</td>
</tr>
<tr>
<td>Appreciation for the ethical values of being a professional</td>
<td>3.9</td>
<td>3.9</td>
</tr>
<tr>
<td>Communication skills</td>
<td>4.6</td>
<td>3.0</td>
</tr>
<tr>
<td>Understanding of the social, economic and environmental impact of my work</td>
<td>3.5</td>
<td>2.7</td>
</tr>
<tr>
<td>Interest and ability to keep up-to-date through continuing education</td>
<td>3.9</td>
<td>3.3</td>
</tr>
<tr>
<td>Knowledge of contemporary issues that affect my work</td>
<td>3.8</td>
<td>3.2</td>
</tr>
<tr>
<td>Ability to use modern engineering techniques, skills &amp; tools</td>
<td>3.7</td>
<td>3.8</td>
</tr>
</tbody>
</table>

**Overall, how satisfied are you with your GRADUATE educational experience at the University of Michigan? AVERAGE = 4.4** (67% of the responses falls within the range of 3.7 and 5.0)

5 Very satisfied  4 Satisfied  3 Neutral  2 Somewhat dissatisfied  1 Dissatisfied
PART IV. General IOE Assessments
This part focuses on the usefulness the general IOE program overall—undergraduate and graduate level.

23. Please rate how important courses you took in the Industrial & Operations Engineering Department prepared you in the areas below (skip if you did not take courses in the area).

Circle the appropriate number for A & B using the following scales:
A: 5=always necessary B: 5=excellent preparation
4=often useful 4=good preparation
3=useful 3=some preparation
2=rarely useful 2=slight preparation
1=never used, needed 1=no preparation

<table>
<thead>
<tr>
<th>IOE Course areas</th>
<th>A: Importance (Avg.)</th>
<th>B: IOE Preparation (Avg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations research</td>
<td>2.9</td>
<td>3.5</td>
</tr>
<tr>
<td>Ergonomics</td>
<td>2.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Production and inventory control</td>
<td>3.3</td>
<td>3.4</td>
</tr>
<tr>
<td>Information systems</td>
<td>4.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Engineering economy and capital budgeting</td>
<td>3.8</td>
<td>3.5</td>
</tr>
<tr>
<td>Work measurement</td>
<td>2.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Simulation</td>
<td>2.8</td>
<td>3.2</td>
</tr>
<tr>
<td>Safety engineering and management</td>
<td>2.6</td>
<td>2.8</td>
</tr>
<tr>
<td>Organizational management</td>
<td>4.0</td>
<td>3.2</td>
</tr>
<tr>
<td>Hospital engineering</td>
<td>1.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Facility layout</td>
<td>2.8</td>
<td>3.1</td>
</tr>
<tr>
<td>Senior projects</td>
<td>3.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Other</td>
<td>4.2</td>
<td>3.3</td>
</tr>
</tbody>
</table>

24. Overall, how would you rate the quality of education you received from the IOE program (compared to what you’ve heard about other IOE programs in other universities)? AVERAGE = 3.8 (67% between 3.0 and 4.6)
5 The Best 4 Exceptional 3 Good 2 Fair 1 Poor

25. How would you rate the balance of theory and application in the IOE program for you professionally? AVERAGE = 3.5 (67% of the responses falls within the range of 2.9 and 4.2)
5 Much too theoretical 4 Too theoretical 3 Right balance 2 Too applied 1 Much too applied

26. How satisfied are you with the following?
5 Very satisfied 4 Satisfied 3 Neutral 2 Somewhat dissatisfied 1 Dissatisfied

<table>
<thead>
<tr>
<th>A. The IOE program overall</th>
<th>Average</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOE Faculty/Staff</td>
<td>4.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Other IOE Students</td>
<td>4.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Other UM programs/opportunities</td>
<td>4.0</td>
<td>0.8</td>
</tr>
<tr>
<td>UM placement services</td>
<td>4.2</td>
<td>0.8</td>
</tr>
<tr>
<td>B. Job hunting overall</td>
<td>3.4</td>
<td>1.1</td>
</tr>
<tr>
<td>C. Salary offer</td>
<td>3.5</td>
<td>1.0</td>
</tr>
<tr>
<td>D. Job location</td>
<td>3.8</td>
<td>0.9</td>
</tr>
<tr>
<td>E. Job function</td>
<td>4.1</td>
<td>0.9</td>
</tr>
</tbody>
</table>
alumni survey. The college has taken over this activity and is surveying selected classes rotating every year. We decided to add our own IOE-specific page and survey the rest of our alumni. Okay, we admit it, we are gluttons for punishment.

In this issue you can see the results of the 1999 IOE Alumni Survey. You can peruse it as you wish. Here are a few highlights:

- Of those in IOE getting advanced degrees 31% got MBAs and 29% got an M.S. or M.Eng. Almost 6% got Ph.D.s in engineering and we even have lawyers and M.D.s out there.
- Average salaries in 1999 were $92K and presumably have risen some since.
- Our graduates have worked for almost 3 different companies on average.
- Looking back, the most important skills learned at the undergraduate and graduate level are communication skills and the ability to function on a team. Teamwork seems well taught at the undergraduate level. Communication skills were moderately well taught at both levels—some work there seems to be required.
- Information systems and organizational management are the most important areas for your careers and preparation in these was “good.”
- Overall you were quite happy with the overall quality of education at IOE (3.8 is almost “exceptional”).
- Interestingly, when we look at income by degree those with a B.S. in IOE score the highest on average.

We had an excellent response rate to our survey which to us reflects your enthusiasm with IOE and U.M. It is clear you still feel part of the community and that is what this newsletter is trying to encourage. Thanks!
Center For Ergonomics
By Thomas Armstrong, Professor, IOE and Director, Center for Ergonomics

The University of Michigan Center for Ergonomics is a multi-disciplinary unit devoted to education and research in ergonomics, the study of work and the efficiency and safety of human-machine systems. While much of the Center's work is in areas of physical ergonomics as it relates industrial and occupational applications, work in the area of cognitive ergonomics is growing and is complemented by activities in the University of Michigan Transportation Research Institute. Descriptions of some Center for Ergonomics activities follow and additional information can be found on our web site: http://www.engin.umich.edu/dept/ioe/C4E.

The Center for Ergonomics director is Professor Tom Armstrong. In addition to Professor Armstrong, other faculty participating in the Center include: Professors Don Chaffin, Monroe Keyserling, Yili Liu and Bernard Martin from the Department of Industrial and Operations Engineering; Alfred Franzblau, an occupational health physician from the Department of Environmental Health Sciences; and Robert Werner, a physician from the Department of Physical Medicine and Rehabilitation. Primary Center staff include: Eyvind Claxton, senior engineering technician; James Foulke, Chuck Woolley and Sheryl Ulin, senior research associates; Heidi Koester, senior research fellow; and Randy Rabourn, project manager. Patricia Cottrell, Pat Terrell and Kathleen Hanks provide administrative support to make the Center run smoothly.

Individual interests of Center for Ergonomics faculty are pursued in many different ways. Individual projects as well as collaborative projects between Center faculty members and other organizations are conducted. Dr. Armstrong's work is concerned with computerized tools for quantification of work related risk factors of musculoskeletal disorders and designing jobs and with models and procedures for preventing work disability. Dr. Chaffin is modeling human motion and collaborates with the University of Michigan Transportation Research Institute and the Statistics Department. Dr. Keyserling is investigating various methodologies for analyzing work and also directs the occupational safety aspects of our academic program. Dr. Martin is studying ways of measuring muscle fatigue and has collaborated with investigators from the Lawrence Livermore National Laboratories. Dr. Liu's research is concerned with human performance and aesthetics, with a goal of developing mathematical models and design guidelines for describing the relationship between users' perceptions of equipment and engineering system parameters.

A major Center for Ergonomics activity includes our Rehabilitation Engineering Research Center (RERC) on Ergonomic Solutions for Employment. The RERC will help all people participate in activities of work and help employers attract and preserve workers. This RERC is in its third year and is funded by the National Institute on Disability and Rehabilitation Research and involves a number of projects exploring:

- procedures for identifying ergonomic interventions
- back pain, bending and work capacity
- back pain, spinal cord injuries and reach performance
- epicondylitis and work capacity
- natural history of musculoskeletal disorders
- use of continuous voice recognition systems and a demonstration web site including a database of jobs with ergonomic assessments to facilitate worker placement.

The RERC involves collaborations with employers, medical service providers and workers and most of our Center faculty and staff. It also involves in a number of outreach activities with other universities and professional organizations. Please visit our web site at: http://umrerc.engin.umich.edu for more information.

A new Center project includes studies concerned with preventing disability in automobile assembly plants. This UAW-GM supported project is concerned with:

- Using exercises to prevent upper limb disorders and
- Identifying factors that affect the return to work of persons with upper limb disorders, including carpal tunnel syndrome.
Presently there are 12 Ph.D., 8 M.S. and 6 undergraduate students from Industrial Engineering, Biomedical Engineering, Occupational Health, Physical Therapy and Statistics working in the Center for Ergonomics. This broad range of backgrounds provides a rich work and learning environment for students interested in Ergonomics.

The Center for Ergonomics continues to maintain a strong continuing education program. The annual “Occupational Ergonomics” program is now in its twenty-second year. This course provides a state-of-the-art treatment of ergonomics as it relates to the design of manual work activities and is highly attended by engineers and safety and health professionals. This year’s offering will be May 14-18 and followed by the “Ergonomics: Job Analysis and Field Studies,” May 21-23. The Center conducts other ergonomics-related continuing education programs which draw attendees from across the nation. In the recent past we have collaborated to develop and offer programs with a national and international scope with organizations including: UC Berkeley, UCLA, the Rehabilitation Engineering and Assistive Technology Society of North America, the Society of Automotive Engineers, and the American Industrial Hygiene Association. Center for Ergonomics faculty and staff have also participated in national programs with the Rehabilitation Services Network, the American College of Occupational and Environmental Health State of the Art Conference, the Institute for Industrial Engineers, the ACM Computer Human Interaction meeting and a large number of additional programs and conferences conducted by other organizations.

The Center for Ergonomics has also been active within the state of Michigan, providing ergonomics training and consultation to small businesses across the state. This project is supported by a Safety Education and Training (SET) grant provided by the Michigan Department of Consumer and Industry services. SET grants are awarded annually based upon merit and we are currently in our tenth consecutive year of funding.

Program Updates

Financial Engineering Program
By Romesh Saigal, Professor, Industrial and Operations Engineering and Interim Director, Financial Engineering Program

The Master of Science program in Financial Engineering has now been in existence since 1997 and has graduated 46 students with the degree. It has survived the departure of its first director Professor John Birge (who left us for Northwestern) and key faculty members Professors Vadim Linetsky (IOE) (to Northwestern) and Ronnie Sircar (Math) (to Princeton). Starting fall of 2000, Professors Jussi Keppo, Jan Vecer (IOE) and Mattias Jonsson (Math) have joined the program. We welcome them to Michigan.

MSFE is a Rackham Interdisciplinary program and the departments of IOE, EECS, Mathematics, Economics, Statistics, Finance of Business School and the Center for the Study of Complex Systems participate in it. This university wide span of the program differentiates it from other competing programs, all of which reside in one department, and enables us to accommodate students from economics, business, math, IOE, EECS and business. UC, Berkeley is the latest university to offer an MSFE degree and their program resides in the business school.

Students with this degree are in great demand. Companies hiring them include energy companies (Enron), investment banks (Morgan Stanley Dean Witter), banks (Credit Swiss), mutual funds (T. Rowe Price), hedge funds (Susquehanna Partners), corporate departments (Ford Credit), government (World Bank) and consulting companies (Author Anderson). The salary offers are mostly in six figures.

We are actively pursuing connections with industry, and have a contract (under the guidance of Professor Jussi Keppo) with Fortum (a Finnish energy company) to study the emerging energy derivative markets in Europe. Professor Keppo is also involved in a feasibility study of the emerging markets in Bandwidth derivatives with European telecommunication companies. We also have interns working at the trading floor of DTE Trading (a subsidiary of the Detroit Edison Company) with offices in Ann Arbor. We expect to increase our interactions with them in the future.
New Ventures for the IPQI lab
By Jan Shi, Professor, IOE and Director, In-Process Quality Improvement Research Lab.

In the past year, the In-Process Quality Improvement Research Lab at the Industrial and Operations Engineering has been continuously conducting advanced researches on the in-process quality improvements methodologies and their applications in various manufacturing processes, including:

- Stream of Variation modeling and analysis for machining processes (funded by NSF ERC) and for assembly processes (funded by DamilerChrysler),
- Distributed sensing for automotive body assembly processes (funded by NSF I/U CRC and Perceptron Inc.)
- IPQI methodology and Proactive Maintenance in manufacturing (funded by NSF)
- Quality and Reliability modeling and analysis for multistage manufacturing processes (funded by NSF and GM Satellite lab at UM)
- In addition to those ongoing R&D efforts, two new initiatives have been developed in year 2000. A brief summary of those new ventures is summarized below:
  - New NIST-Advanced Technology Program (ATP) Project: A new project on “Smartsmith: An Imaging-based High Temperature Deformation Process Control System” has been awarded to OG Technologies, Inc. in 2000. This three-year project is aimed at developing advanced in-process image sensing (HotEye) and process control techniques to significantly improve the yield, quality and reduce the cost in high temperature deformation manufacturing processes. The U of M is a subcontractor of the project, who is responsible for developing “Smartsmith Predictive Process Control System” through sensing fusion, process modeling and analysis, and predictive control.
  - Business Intelligence (BI) and Consumer Relationship Management (CRM) initiative: Another initiative is to study the BI and CRM with several companies. The CRM and BI focus on developing strategies that for manage all customer interactions in order to strengthen individual customer relationships, improve brand loyalty, and increase customer acquisition, retention, and lifetime value. As the Internet

Program in Occupational Safety Engineering and Ergonomics
By W. Monroe Keyserling, Professor, IOE and Associate Director, University of Michigan Center for Occupational Health and Safety Engineering

The IOE graduate program in Occupational Safety Engineering and Ergonomics has received a grant from the National Institute for Occupational Safety and Health (NIOSH) totaling $140,000 for the 2001-01 academic year. This grant is used to support the training of Masters and Ph.D. students who plan professional or research careers in Occupational Safety and Ergonomics. In addition, the grant supports library and laboratory facilities in the IOE Building. The program has also received a supplemental grant of $65,000 to support pilot research projects in occupational health and safety. For additional information on financial aid opportunities, contact Prof. Monroe Keyserling.
J apan Technology Management Programs

By Jeffrey Liker, Newsletter Editor, Professor and Director, Japan Technology Management Programs

The Japan Technology Management Program is now cruising along on its own bottom. JTMP was founded in 1991 to learn about what at the time made the Japanese among the fastest growing leaders in manufacturing. The Air Force Office of Scientific Research funded about a dozen schools to study Japanese technology management practices, teach those practices to U.S. companies, support technically oriented U.M. students to learn Japanese, and arrange for internships for technically oriented students in Japan. Ultimately the goal for the program was to become self-sufficient with purely private funding.

JTMP has weathered a major recession in Japan which continues on today and has made Japanese design and manufacturing methods less directly appealing to study. We have survived by shifting our focus from studying what “the Japanese” do to focusing on the transfer of practices of top Japanese automotive companies to the U.S. In particular, we have focused principally on Toyota. Its world renown Toyota Production System is now viewed as the next paradigm beyond mass production for contemporary manufacturing. Companies across industries across the world are adopting this paradigm with striking improvements in productivity, quality, and customer service levels.

Lean also means flexibility for modern companies attempting to compete in the Internet age. The U.M. continues working with the Lean Enterprise Institute where John Shook (former JTMP Director) and James Womack provide leadership in the “lean thinking” movement. We are busily preparing for our Seventh Annual Lean Manufacturing Conference which draws over 400 people to Dearborn to get the latest on what is happening in the lean world. The focus this year is on: OEMs and Suppliers: Partners in Lean?

Ph.D. students continue to research topics that are derived from the original JTMP research questions. These include:

1. What types of changes are needed in relationships between OEMs and their suppliers as OEMs (auto companies in this case) continue to outsource more vehicle content in the form of modules and expect every increasing design responsibility by their largest suppliers? (Young Ro)
2. How can lean thinking be applied to supply change networks, particularly across the logistics systems that link suppliers and their customers? (Jennifer Karlin)
3. How can I.T. be used to create lean logistics systems and replace manual kanban systems without losing the essence of that powerful lean tool? (Eduardo Lander)
4. How can we demonstrate the system benefits of lean enterprises even though local costs might actually increase, e.g., the cost of having less than full truckloads of parts shipped to plants versus the benefits of small lot production and delivery? (Kuo-Ting Hung)
5. What allows Toyota to achieve product development lead times of 14 months while its U.S. competitors are still struggling to get below 36 months? (James Morgan)

Most of the research above is not funded by JTMP but is a direct spin-off of earlier supported research. A new research project in 1999-2000 was a study of how lean manufacturing can be applied to U.S. shipbuilding funded by the Navy. A “Guide to Lean Shipbuilding” was issues that has gotten widespread attention throughout the industry. The capstone of this project was a tour for shipbuilders of Toyota and its affiliated seat supplier Trim Masters which included a broad cross-section of the industry including two Admirals. Lean shipbuilding is gaining acceptance as the paradigm that offers to pull American shipbuilding out of its slump and help rebuild its global competitiveness.

In addition to research JTMP continues on its mission of disseminating practical knowledge on what has been learned over the years. This has been most notable in the case of lean manufacturing. In addition to the annual conference mentioned above, an indirect spin-off of JTMP is U.M.s new lean manufacturing short course program housed in the Center for Professional Development. The co-Directors were all funded by JTMP in the past-Jeff Liker, Yavuz Bozer, and Izak Duenyas. A 10 day certificate program has been offered every month in the last year and 1/2 and most offerings have sold out. Customized courses have been offered to Steelcase, Ford,
DaimlerChrysler, and Emhart Fasteners. There is evidence of significant implementation of lean manufacturing by “alumni” of the certificate program.

JTMP always has as a core mission to teach students and we are doing so in two ways. First, we hold an annual tour to Toyota and Toyota suppliers in the Georgetown, Kentucky area. Second, we continue to arrange and sponsor internships in Japan. For example, in the coming summer, through the hard work of Associate Director Heidi Tietjen, we are sending 11 students to Japan for internships.

We are proud of all the accomplishments of JTMP over the years. We are especially proud to still be contributing without the support of our original federal sponsors.

TMI Manufactures Multidisciplinary Success
By Yavuz A. Bozer, Professor, IOE and Co-Director, Tauber Manufacturing Institute

In the last decade, vast changes have shaken the manufacturing industry to its core. Emerging technologies, expanding global opportunities and rising consumer expectations are just a few of things shaping today’s manufacturing landscape. More than ever, firms need leaders with both broad and specific expertise, and a knack for managing discontinuous change.

The Tauber Manufacturing Institute (TMI) at the University of Michigan creates these leaders. Combining a rigorous curriculum of both business and engineering courses with a custom leadership development core, TMI builds managers who can understand the technical aspects of a firm’s operations and bring them in line with its business functions. These managers need expert engineering knowledge, superior business acumen and the kind of personal leadership savvy that will get things done.

Launched in 1993 as a cooperative effort between the College of Engineering and the Business School, TMI quickly became one of the top multidisciplinary programs in the country. It is the only major manufacturing program that offers a full-range of degree options for both graduate and undergraduate students. In addition to normal degree requirements, TMI students complete an intensive leadership program in engineering and business that culminates into a team-based, 14-week paid internship with a high profile manufacturing company.

More than just internships, these TMI projects are at the heart of everything TMI tries to achieve: teamwork, integration and manufacturing success. Usually comprised of two to three students from both the Business School and the College of Engineering, Team Projects test students’ collaborative skills. As engineers and business managers, they must work together to analyze a current manufacturing problem and design and implement a solution that improves their company’s performance. At the end of the internship, students present their results to company executives in a review meeting and also to a panel of industry judges at the annual Spotlight scholarship event.

At Spotlight! 2000, TMI hosted over 200 people, 43 companies and 19 projects. TMI awarded over $23,000 in scholarships for superb team project performance. Tying for first place, teams from Copeland Corporation and Steelcase split $16,500 of award money. The Copeland team was highly praised by judges for their implementation of a pull system to manage overseas inventories and reduce the effects of highly volatile demand patterns. Team Steelcase won accolades for its design of a strategic capacity planning process that would allow Steelcase to maximize its production capacity while offering highly customizable products to its customers.

In third place, the team from McKinsey & Company won $4000 with their presentation entitled “Lean Transformation in a Consumer Products Company.” The team analyzed scheduling and warehousing for the client company and delivered a plan for sustaining high levels of customer service while increasing flexibility and reducing costs. Fourth place honors and $3000 went to the team from Carrier Corporation for their development of a “make or buy” best practice model that would integrate into Carrier’s global manufacturing strategy.
Fran Bourdas Retired!
By Rod Capps, Computer Systems Specialist II

Fran Bourdas, Graduate Student Advisor for the IOE Department is retiring on January 31, 2001. We're going to miss her!

If you'd like, please take a moment to send her an e-mail wishing her the best at: bourdas@umich.edu. Fran has had a long and distinguished career in the College and at the University of Michigan. She began her career as a Research Secretary in the Robot Systems Division in Electrical Engineering and Computer Science in September 1983.

Fran worked from 1985 - 1990 as Executive Secretary to Walton M. Hancock, who was the William Clay Ford Professor of Product Manufacturing, Associate Dean for Manufacturing Initiatives, and the Director of the Center for Research on Integrated Manufacturing in the CoE.

In early 1990 Fran worked for Provost Charles Vest during his transition to President of M.I.T. In August 1990 Fran began working in the IOE Graduate Student Office of the Department of Industrial and Operations Engineering. As you know, she currently is the IOE Graduate Student Advisor serving the faculty and students of this Department.

We hear Fran hopes to spend more time with her husband, grandchildren, and dogs - as well as travel a bit!

All of us at the IOE Department would like to thank her for 11 years of work with IOE and offer her best wishes for the future!

Program Updates

Engineering Global Leadership Program
By Yavuz Bozer, Professor, IOE

The Engineering Global Leadership (EGL) program continues to flourish in the IOE department, attracting some of the best students in the department to manufacturing and to TMI. Starting in 2001, the EGL program will be expanded to include undergraduate students from the Mechanical Engineering (ME) department as well. Students who are admitted into EGL will now have two options: Manufacturing or Financial Engineering. Those who plan to pursue manufacturing, will apply separately to TMI.

“EGL students complete two summer projects during their studies. One of the projects is a TMI summer project sponsored by an industrial partner. Working side-by-side, full-time (at an industrial site) with graduate students from the Business School (MBA students) and the Engineering College (Program in Manufacturing, Master of Engineering students), EGL students focus on specific manufacturing problems defined jointly by the sponsor and TMI.”

The mission of the Engineering Global Leadership Honors Program (EGL) is to produce business leaders with the ability to communicate across the engineering and business boundaries and to function effectively in the business operations of another country. The curriculum consists of 158 credit hours of engineering, business, and cultural core classes, and leads to a Bachelor of Science in Engineering and a Master of Science in Industrial and Operations Engineering in five years of full-time study.
Pam Receives CoE Excellence in Staff Service Award!

Pam Linderman, our Undergraduate Student Advisor, was presented with the Excellence in Staff Service Award 2001 by the College of Engineering.

Here is the article published by the college illustrating Pam’s achievements:

When the IOE undergraduate enrollment surged in the last few years from around 300 students to over 550, Pam welcomed them with open arms. Despite an increased workload and widening logistical tasks, Pam continued to advise them with a superb level of cares, dedication and ease worthy of a much smaller program. Pam’s coworkers continue to be amazed at the amount of personal attention and knowledge Pam can convey to her students.

For over 16 years, Pam has helped provide leadership and direction in undergraduate advising to the IOE department and the College of Engineering. Never failing to take the initiative, Pam single-handedly developed and introduced peer advising to the department 10 years ago. It has since become a model for similar programs around the College. In 1993, she took the Engineering Global Leadership Honors Program under her wing and helped grow it into one of the most successful student programs at the College. She also championed the creation of the IOE Student Handbook and the student development of the first IOE web site.

Pam’s coworkers praise her ability to be both a student advocate and a valued assistant to the faculty. Her ability to identify opportunities, plan projects and engage students has helped create enormous growth for her department, while maintaining a superior level of service and quality.

Congratulations, Pam! Thanks for those who wrote the supporting letters in nominating Pam for the award!

IOE Alumni Online

By Ken Hung, Newsletter Assistant Editor and Ph.D Candidate, IOE

Our departmental Senior Computer Systems Specialist, Christopher Konrad, and Computer Systems Specialist, Rod Capps, have been working hard on the IOE web site. Recently, they have developed an Alumni List database where you may register as a member and then update your profile as it changes. There are also links to obtaining transcripts, UM Alumni Association, Alumni Career Center and UM Athletics Department.

The main page for IOE Alumni is the alumni page at http://ioe.engin.umich.edu/alumni.html. You can check if your name is on the Alumni List at http://ioe.engin.umich.edu/alumni/alumlist.asp. To register yourself online please go to Online Registration at http://ioe.engin.umich.edu/Alumni/alumform.asp.

For those of you who are interested in keeping up with our faculties’ research activities, now you can search for their technical reports in our web site at http://ioe.engin.umich.edu/techrprt.html. Many technical reports have already been converted into PDF format and are available for download. If a technical report is not available for download, you can send in a request through the site.

U.S. News Ranks us No. 2 in US!

The U.S. News & World Report’s 2001 Graduate School Rankings listed the UM College of Engineering fourth in the nation, with the Industrial and Operational Engineering ranking second in the Industrial/Manufacturing Programs. This ranking was computed in January of 2001, based on data from a survey sent out in the fall of the previous year.
Alpha Pi Mu (APM)  
By Veronica A. Valencia, Chapter President

Alpha Pi Mu is continuing to provide opportunities for members to meet other students and become more involved in bettering our department and the college experience. Many of the successful events from the past will be held again this year along with a few new programs. A new community service event will involve building a relationship with an area high school. Our hope is to teach students about engineering, evoke interest in the field, and serve as mentors to the students. We will also participate in community service events such as Habitat for Humanity, Tech Day, Ronald McDonald House and tutoring. Furthermore, we will award winners for the Wyeth B. Allen Memorial Scholarship and IOE Professor and Graduate Student of the Year. Fund-raising events will include a t-shirt/sweatshirt sale, resume book sales and caramel apple sales. We are continuing the tradition of the IOE newsletter, the Industrial Blueprint. The articles cover a vast amount of topics concerning IOE students and are mostly written by APM initiates. In the area of professional development, we will continue to have company presentations, the exam file, senior advice night, and the IOE Career Pathways dinner. We are also thinking of having a graduate student panel and planning an IOE Career Fair with IIE and VIBES. Last but not least, we will take part in many social events this year. We will compete with Tau Beta Pi for the Capture the Flag trophy. We will have Happy Hours, the IOE barbecue, the initiation banquet, Rock ‘n Bowl, and intramural sports. In facilitating a relationship with faculty, we will continue to sponsor IOE get-togethers and invite professors to speak at APM meetings. Having faculty-student luncheons is a new event we would like to try. It will be a very exciting and productive year!

Institute of Industrial Engineers (IIE)  
By Jennifer Jaramillo, Chapter President

The Institute of Industrial Engineers strives to provide an awareness of the Industrial and Operations Department and its resources. IIE works to develop an interdepartmental relationship and present information into career opportunities. Maintaining a strong relationship with the IIE Detroit Senior Chapter creates an industry connection easily accessed by all students. We also try to plan events that will bring IOE students together. This semester we planned or are planning many activities such as Rock ‘n’ Bowl, happy hours, pub crawls, intramural sports, plant trips, and mock interviews. We also put out several publications such as the Industrial Blueprint (in coordination with Alpha Pi Mu) and the IOE Yearbook, which comes out in April.

INFORMS Student Group  
By Barrett Thomas, 2001 President

The Institute for Operations Research and Management Science (INFORMS) is a professional organization of operations research and management science practitioners. The national organization is probably best recognized for its peer reviewed journals such Operations Research, Management Science, and Transportation Science. The national organization also facilitates semiannual conferences, where faculty and students present new research and network with others in their respective areas.

At the University of Michigan, IOE students have organized a student chapter of INFORMS. The student chapter’s primary function is to bring together students working in the various sub fields of operations research and management science. The group’s primary activity has been symposia. These symposia are student research presentations, and aim to both make students aware of one another’s work, and to allow students to practice their presentation skills in front of a “friendly” audience. In addition to the symposia, the INFORMS student group sponsors a number of social activities and acts as a liaison with the national organization.
Vibrant Industrial Black Engineering Students (VIBES)
By Brandi Parker, President

Vibrant Industrial Black Engineering Students (VIBES) was founded in 1993 for the purpose of improving the preparation of minority industrial engineers at the University of Michigan. Since that time, the organization has expanded tremendously and seen many of its members graduate, embodied in the VIBES spirit of academic excellence, professional success and community awareness.

We have set the following objectives in order to accomplish our goal:

• Provide the necessary academic resources so that students may compete on an academic level at the University.
• Increase the awareness of industrial engineering among minorities and the many options existing in the field.
• Increase relations between students and faculty members.
• Help develop professional skills so that students are prepared for careers after graduation.
• Provide a strong support network through student, corporate, faculty, and alumni participation.

We realize that the key to our success will be in our ability to find proper resources and extending those resources to our students. This year, we are hard at work planning activities that can bring together many resources for our students. Some of the upcoming events that we have planned are Options in Industrial Engineering Day, Plant Trips, attendance at Midwest Minority Career Conference, Faculty-Student Mixer, IOE Career Fair, Alumni Dinner and Recognition, monthly social activities, and monthly industry-sponsored lectures and workshops. In addition to these events, we are organizing both student and corporate mentorship programs, where students can have more personal relations on an ongoing basis.

VIBES is very excited about the possibilities that networking with alumni can bring to our organization. We invite interested alumni to contact us at vibes-ebd@umich.edu or please call us at (734) 764-3026.

VIBES would like to thank Dr. Jerry Duncan and the John Deere Foundation for their most generous support. We greatly appreciate it.

Society of Women Engineers (SWE)
By Kelly Alstead, 2001 President

The Society of Women Engineers hit the ground running this fall with our Pre-Interview program going strong and the successful completion of our largest ever Career Fair. Thousands of students and over 240 companies participated. One of our largest events this Fall was the Women in Engineering Symposium on November 8. One of our biggest events this fall was the Mr. Engineer Competition, in where all the proceeds were donated to SafeHouse. Lots of other community service events at the Ronald McDonald House, high school visits to tell students about the opportunities in engineering, and our high school student Shadow Day are planned for the semester. For more information about events please call (734) 763-5027 or e-mail swe.info@umich.edu.
Tom Armstrong, tja@engin.umich.edu

Thomas Armstrong continues director of the Center for Ergonomics and of the University of Michigan Rehabilitation Engineering Research Center on Ergonomic solutions. He chairs the American National Standards Institute accredited Z-365 committee on Work Related Musculoskeletal Disorders that is concerned with the development of an national voluntary consensus standard on a program for control of musculoskeletal disorders in work settings. He also is a special consultant to the American Conference of Governmental Industrial Hygienist, ACGIH, Physical Agents Committee. This year the ACGIH published its first Threshold Limit Value, TLV, for acceptable exposures to monotask hand work (see: www.acgih.org). Professor Armstrong also chairs the IOE Admissions and Financial Aid Committee. We find that the reputation of our alums is one of our most valuable recruiting tool — keep up the good work. Professor Armstrong's research is increasing focused on preventing and managing work place disability. He is working on several web based tools to assist employers, occupational health professionals and workers (see: umrerc.engin.umich.edu). Professor Armstrong has recently introduced a new 400 level course entitled: Applied Engineering Anthropometry.

James Bean, jbean@umich.edu

James Bean is Associate Dean for Graduate Education in the College of Engineering and President of the Institute for Operations Research and the Management Sciences (INFORMS). He continues to work with Professor Chelsea White on an NSF funded study of partially observed Markov decision processes. Professor Bean also works with faculty in LSA and the School of Natural Resources and the Environment on life-cycle costing of the family automobile considering economics, energy consumption and emissions.

Yavuz Bozer, yabozer@umich.edu

Yavuz A. Bozer was appointed as the Goff Smith Engineering Co-Director of TMI (Taubers Manufacturing Institute) effective September 1999. He is also a co-director of the Lean Manufacturing Certificate Program offered through the Center for Professional Development (CPD) at U-M. He continues to work in the area of parts-flow and supply in manufacturing, distribution, and storage facilities as well as facility design. He has also been co-teaching (with Professor William Lovejoy from the U-M Business School) the IPD (Integrated Product Design) course, where teams of students from multiple disciplines design actual products and compete in the "market" through a web-based competition and a physical trade show. His recent work is concerned with many-to-one parts-supply networks (as in automotive assembly plants), material handling systems for reconfigurable machining systems, material handling routes/strategies in pull production environments, and capacity planning in web-enabled order picking and distribution systems. He is also working on the 3rd edition of Facilities Planning by Wiley. He will be on sabbatical leave during the 2001-02 academic year pending approval.

Don Chaffin, dchaffin@umich.edu

About three years ago, Don Chaffin and others within the Center for Ergonomics and Statistics launched the Human Motion Simulation (HUMOSIM) Laboratory. Currently, eight organizations support the Laboratory’s $0.5 million annual budget. Over 34,000 human reaching motions performed by a variety of volunteers have been studied. Julian Faraway (Statistics), Bernard Martin (IOE), Matt Reed (UMTRI) and five Ph.D. students are modeling these motion data. The resulting models will enable quicker and more accurate representation of people’s motion in future computer-aided ergonomic designs of workstations and vehicle interiors. Chaffin has co-authored a new book entitled: "Digital Human Modeling in Vehicle and Workstation Design" on this topic. Chuck Woolley and Don Chaffin also have concluded the development of an advanced worker strength assessment system for Boeing Aircraft.
Stephen Chick, sechick@umich.edu

Stephen Chick's work in simulation is progressing on both theoretical and applied fronts. Work with his former PhD student, Koichiro Inoue, was recently written up in the online journal Advanced Manufacturing Technology. That work improves the efficiency of simulation experiments that identify the best of several competing alternatives. Those results were funded in part by the ERC for Reconfigurable Manufacturing Systems. Prof. Chick and Prof. James Koopman (Epidemiology Department) continue to use simulation techniques to improve health care decisions. In a new project funded by the National Institutes of Health, they use simulation to evaluate design decisions for clinical trials for infectious diseases. The work is being directed toward new vaccines under development for nontypable H. influenza, a major cause of ear infections in children.

Izak Duenyas, duenyas@bus.umich.edu

Izak Duenyas was appointed John Psarouthakis Research Professor of Manufacturing Management and Professor of Operations Management in September 2000. He continues his work with IOE students at the PhD and master's level. His graduate student, Hyun-Soo Ahn recently accepted an appointment at the University of California-Berkeley as an assistant professor. Izak Duenyas also continues his research on supply chain management and production and inventory control. In the last year, he has received a multi-year grant from NSF on joint maintenance and production control planning and staffing and a grant from Ford. Izak Duenyas has also been active in executive education and serves as a co-director of a lean manufacturing certificate program offered through engineering and faculty director of an executive supply chain management program through the Business School.

Gary Herrin, gdherrin@umich.edu

Gary Herrin now serves as Assistant Dean for Students in the College of Engineering. In this position he is responsible for staffing first year engineering courses (about 70 instructors), leading the Advising Center (with about 1700 students seeking to identify a suitable college major), resolving administrative issues for roughly 4800 undergraduate students including maintaining student records, degree auditing, room scheduling, etc. In his spare time, he teaches IOE 366 “Linear Statistical Models” and co-teaches a “Six Sigma” quality course for the COE Center for Professional Development.

Marina Epelman, mepelman@umich.edu

Marina Epelman joined the department in the fall of 1999. Her primary interests are in the area of continuous optimization; she is working on analysis of algorithm complexity and geometric properties of optimization problems. She is also conducting joint research with other IOE faculty on applications of optimization techniques in practical problems, such as vehicle routing. Her teaching includes IOE 310, IOE 511 and IOE 510.
Shane Henderson, shaneioe@umich.edu
Shane Henderson returned in October of 1999 from a leave in New Zealand. He teaches courses in mathematical modeling, simulation, and queueing theory. His research continues on the design and optimization of systems that contain a great deal of uncertainty. Examples where he is applying this work are with
- The St. John Ambulance Service in Auckland, New Zealand: Deciding where and when to place ambulances to ensure that response times to calls are acceptable.
- Zeacom Ltd (previously known as Voice Technology Ltd), a New Zealand based company that specializes in call centre solutions, in determining staff rosters that ensure acceptable customer service at low cost.
- Team New Zealand, the current holders of the America’s Cup, developing simulation software to assist in making design decisions for racing yachts.

Jussi Keppo, keppo@umich.edu
Professor Keppo teaches courses in optimization and financial engineering. His research interests include stochastic control and financial economics. Currently, he is working on pricing of bandwidth derivatives and on applying results from the game theory to determine optimal investment entry times and hedging strategies for large companies. Professor Keppo has consulted in the areas of investment analysis, production optimization, asset pricing, and risk management.

Barry H. Kantowitz, barrykan@umich.edu
Professor Kantowitz is a professor of Industrial and Operations Engineering Department and the director of the U-M Transportation Research Institute (UMTRI). He most recently has been chief scientist of the Battelle Human Factors Transportation Center in Seattle, Wash., after holding academic and administrative posts at Purdue University.

Kantowitz and other human factors researchers study and work to optimize the relationship between systems and people as much as possible, with systems ranging from such complex entities as a 747 airplane to the less complex automobile. Kantowitz was director of Human Factors Graduate Training at Purdue University in 1977–87. He also was assistant, associate and then professor at Purdue, starting in 1969. He holds a B.A. and M.A. in psychology from the City College of the City University of New York (CUNY) and Queens College of CUNY, respectively, and a Ph.D. from the University of Wisconsin-Madison in experimental psychology with a minor in computer science/industrial engineering.

W. Monroe Keyserling, wmkeyser@umich.edu
Monroe Keyserling is one of several IOE faculty participants in the U-M Rehabilitation Engineering Research Center. He is working with Ph.D. student Priya Sudarsan, IOE Prof. Bernard Martin and Dr. Andrew Haig from the U-M Spine Center in a study of how people with chronic back pain and “normal healthy” people tolerate various trunk postures commonly found in manufacturing and service jobs. Guidelines for job design will be developed to reduce the incidence of new back pain cases, and accommodation strategies will be developed to speed the recovery and return to work of existing back pain cases. He recently completed a research project to develop and evaluate ergonomic interventions for reducing the frequency and severity of injuries in automotive service parts packaging and distribution operations. At the national level, Keyserling continues to serve as President of the Association of University Programs in Occupational Health and Safety. He is also a member of the Safety and Occupational Health (SOH) Study Section, a peer review panel that evaluates the scientific merit of grant applications for federal research funds.
Jeffrey Liker was promoted in 2000 from Associate to Full Professor. He continues to conduct research on lean manufacturing as well as the adoption of Japanese approaches to product development and supply chain management in the U.S. auto industry. His book Becoming Lean continues to be read throughout the world as one of the prime sources of information on how to implement lean manufacturing. Dr. Liker has conducted seminars on implementing lean manufacturing in Europe and the U.S. His company, with alum Dann Engels, Optiprise, is implementing lean manufacturing in the U.S., China, Mexico, and Brazil. He also has been co-directing the highly successful lean manufacturing program through the Center for Professional Development at U.M., which is offering certificates in lean manufacturing and customized on-site courses for companies. A paper comparing U.S. and Japanese approaches to integrating suppliers in product development, with former student Nazli Wasti of Middle Eastern Technological University in Turkey, won the best paper award in IEEE Transactions on Engineering Management.

Yili Liu, yiliu@umich.edu

While continuing to teach undergrad and graduate level ergonomics classes and to conduct research on human performance modeling and driver-vehicle interface analysis, Yili Liu has started a new area of teaching and research called "engineering aesthetics" and a closely related area called "aesthetic ergonomics." The objective of "engineering aesthetics" is to use engineering/mathematical methods to study aesthetic concepts in general and design aesthetics in particular. The goal of "aesthetic ergonomics" is to integrate traditional ergonomic concerns of comfort, safety, usability, and productivity, with the aesthetic concerns. He has developed a 400-level IOE course titled "Engineering Aesthetics" and is teaching it for the first time in Winter 2001 to a full class. Beginning the fall of 1998, Yili Liu is serving as the Undergrad Program Advisor of the IOE Department.

Bernard Martin, martinbj@umich.edu

Bernard Martin's research interests involve the study of human sensorimotor control systems. He continues to study the effects of mechanical vibration on humans and more specifically the contribution of vibration to muscle fatigue and upper limb disorders. Muscle fatigue and low back pain is also studied as part of the research program developed within the new Rehabilitation Engineering Research Center. Muscle load in computer keyboard and pointing devices use, and in lifting/carrying tasks are studied in collaborative projects with the University of California, San Francisco and the Lawrence Livermore National Laboratory, respectively. He is the co-author, with D. Chaffin and G. Anderson, of the third edition of the book "Occupational Biomechanics", Wiley 1999. He continues to teach ergonomics, human performance and biomechanics courses.
Katta Murty, murty@umich.edu

Katta Murty continues the GAANN (Graduate Assistance in Areas of National Need) program (US Dept. of Education) providing full support for five Ph.D. students in IOE. In April 2000 he was invited to give the plenary talk at IO 2000 Conference of the OR Society of Portugal in Setubal, near Lisbon. In November 2000, he gave an invited talk at the DSS (Decision Support Systems) Conference held in Kuwait city on work he has been doing with researchers at HKUST for developing DSS for daily operations in Container Shipping Terminals in Hong Kong. During Summer 2001 he is planning to continue this work. Also, he and visiting researcher Woo Je Kim from Daegu University in South Korea, along with Bob Haessler of UM Business School are in the final stages of developing OLR (Overnight Linehaul Router), a software package for routing trucks for overnight operations in LTL (Less Than Truckload) firms. Another of his activities is preparing a “Self-Teaching Webbook for Computational and Algorithmic Linear Algebra and n-Dimensional Geometry” at sophomore level for IOE undergrads who are having great difficulty with these subjects for a long time. When completed in 2 years (hopefully), IOE students will have free access to it on the web.

Vijay Nair, vnn@umich.edu

Professor Vijay Nair has a joint appointment in IOE and in the Department of Statistics in the College of LS&A. He is currently serving as the Chair of the Statistics Department. He has continued his research activities on engineering statistics over the past year. He published papers on statistical methods for yield and process improvement in semiconductor manufacturing, spatial modeling, robust parameter design for variation reduction, and process control. His research has been supported by two NSF grants and an industrial grant from Ford. Professor Nair is also active in professional organizations and serves on a number of committees and panels.

Stephen Pollock, pollock@umich.edu

Stephen Pollock and his students continue to explore the theoretical and practical bases for a variety of industrially important topics, including cost-minimizing proactive maintenance policies, and comparing “separate” and “joint” decision making in production tool buy-off. A more recent investigation will apply Bayesian decision theory and optimization methods to the design of adaptive conformal beams for the delivery of radiation to tumors, when the tumor location is uncertain. He continues to teach both graduate and undergraduate courses in probability and statistics, decision analysis, queuing systems, stochastic processes and mathematical modeling. This past summer he helped supervise a TMI student summer project for Lucent Technologies.

Romesh Saigal, rsaigal@umich.edu

Professor Romesh Saigal is the graduate Program Advisor for the department, and is the interim director of the Financial Engineering Program in the university. Professor Saigal continues to teach courses in and conduct research in optimization theory and his new book titled Handbook of Semidefinite Programming (co-authored with Professors Lieven Vandenberghe (UCLA) and Henry Wolkowicz (Waterloo)) was published by Kluwer Academic Publishers in the middle of year 2000.
Lawrence M. Seiford, seiford@umich.edu

Lawrence Seiford is the new Chair of IOE. Prior to joining the University of Michigan he was Program Director of the Operations Research and Production Systems programs at the National Science Foundation (1997-2000) and a member of the faculty at the University of Massachusetts. His teaching and research interests are primarily in the areas of quality engineering, productivity analysis, process improvement, distributed-systems design issues, and performance measurement. In addition, he is recognized as one of the world's experts in the methodology of Data Envelopment Analysis (DEA). Current research projects focus on identifying best-practice in the financial services sector and health care delivery systems. In November he was awarded an honorary degree (Doctor Honoris Causa) by the French Ministry of Education at Universite de la Mediterranee Aix-Marseille.

Jan Shi, shihang@umich.edu

Jan Shi continues his research to develop methodologies in the area of in-process quality improvement (IPQI), and application of information technologies in manufacturing area. In addition to his continues research projects with NSF Industrial/University Cooperative Research Center, DaimlerChrysler, General Motors, and Auto Body Consortium, he just received a major multiyear grant from NIST-Advanced Technology Program and OG Technology on image-based predictive process control for high temperature deformation processes. Prof. Shi also serves as the COP leader for the ramp-up projects in the NSF ERC on Reconfigurable Manufacturing Systems. In 2000, Prof. Shi received the 2000 Caddell Memorial Award for Faculty/Student Team (with Jun Ni and Steve Dyer), and his paper received the 2000 Best Paper Award from ASME Manufacturing Engineering Division, and another paper received 2000 NAMRC Best Paper Award Finalist from North America Manufacturing Research Institute. Two of his former Ph.D. graduates recently joined faculty in the University of Wisconsin-Madison, and University of Arizona respectively.

Robert Smith, rlsmith@umich.edu

Robert L. Smith is spending the 2000/2001 Academic Year on Sabbatical Leave. He spent part of the Fall term at the Technical University of Delft in the Netherlands with two of his Ph.D. students and will spend a part of the Winter term at the University of Washington in Seattle. He received the College of Engineering Research Excellence Award for 1999-2000 and is currently engaged in research sponsored by three NSF Grants in global and infinite horizon optimization in addition to a grant from the Army Research Office on mobile communications network design.

C. Jeff Wu, jeffwu@umich.edu

Professor Wu has a joint appointment with the Statistics Department in the College of L.S&A, holding the H.C. Carver Collegiate Professorship of Statistics. His current research interests are in the general areas of statistical methodologies and their engineering applications: experimental design for quality and productivity improvement, variation reduction, and modeling and analysis of complex systems. Besides his long-time interests/experience in manufacturing, he has been working on bioinformatics focusing on gene expression data analysis and drug discovery. He teaches IOE 465 "Design and Analysis of Experiments" based on his recent book "Experiments: Planning, Analysis, and Parameter Design Optimization" (joint with Mike Hamada, 638 pages, Wiley, 2000). Its table of contents, 80+ data and errata list can be found on his website www.stat.lsa.umich.edu/~jeffwu.
Adjunct/Visiting Faculty Focus

Chelsea White III, ccwiii@umich.edu

C. C. White is Director of the Intelligent Transportation Systems Research Center (ITSRC) and Co-Director of The University of Michigan’s Trucking Industry Program (UMTIP). The ITSRC studies various issues associated with the impact of information technology on transportation and is currently supported by MDOT. UMTIP is supported by a grant from the Alfred P. Sloan Foundation and funds research to understand the nation’s motor carrier industry in three broad areas of research, labor and human resources, operations and technology, and benchmarking studies.

John J. Cristiano, John.Cristiano@umich.edu

Dr. John J. Cristiano received his Ph.D. in Industrial and Operations Engineering in 1998, and is currently an Adjunct Assistant Professor in the department. He divides his time between the university and industry consulting in the area of product development and quality systems. Dr. Cristiano teaches the Senior Design Course in Production and Service Systems as well as courses on economic decision making, engineering modeling, and project management. He also serves as Co-Chair of the University of Michigan Management Briefing Series sessions on Leveraging Information Technology in the Lean Enterprise.


Paul Frantz, pfrantz@appliedsafety.com

Dr. Frantz has taught safety management as an adjunct professor since 1993. He is also a co-founder of Applied Safety and Ergonomics, Inc. in Ann Arbor. His research, consulting, and professional interests encompass a variety of topics within ergonomics, product/occupational safety, accident investigation, and hazard communication. He regularly works with companies across the country to address safety and hazard communication issues with consumer and industrial products. Dr. Frantz and his colleagues recently completed a major project involving the development of uniform labeling for personal watercraft (e.g., Jet Skis, Waverunners, etc.) and they have begun work on a project on personal flotation device labeling funded by the U.S. Coast Guard. His recent speaking engagements include an invited address to the U.S. Consumer Product Safety Commission on the subject of product warnings.
Adjunct/Visiting Faculty Focus

Scott Grasman, grasman@umich.edu

Dr. Scott Grasman completed his Ph.D. at May 2000 from the University of Michigan in Industrial and Operations Engineering. His dissertation topic is “Production Strategies for Random Yield Processes.” Dr. Grasman had also earned his B.S.E. and M.S.E. degrees in Industrial and Operations Engineering from the University of Michigan. Over the last 3 years, he has taught IOE 265, IOE 201, IOE 202, IOE 451, and IOE 441. Dr. Grasman’s current research focus are in finite buffer polling models with routing and setting basestock levels in multiproduct systems with setups and random yield.

Paul Green, pagreen@umich.edu

Paul Green has spent the last year working on a variety of projects relating to driver distraction. This includes studies of entering destinations into navigation systems, listening to email while driving, head-up displays, and driver workload. He continues to work on the Society of Automotive Engineers recommended practice that specifies what drivers should not be allowed to do with a navigation system in a moving vehicle, a precursor to an international standard.

Pat Hammett, PHammett@umich.edu

In addition to his IOE teaching responsibilities, Pat Hammett continues to work for the Office for the Study of Automotive Transportation at the University of Michigan Transportation Research Institute where he is now the principal researcher for the manufacturing systems group. The focus of his research continues to be on manufacturing process validation during the launch of new vehicles. Pat is currently working on projects with General Motors, Ford Motor Company and Fuji DieTec in the areas of body dimensional engineering and functional build. Pat also teaches an Accelerated Six Sigma Course through the Center for Professional Development as well as Freshmen Engineering.

Glenn Mazur, gmazur@engin.umich.edu

Glenn Mazur, adjunct lecturer of TQM, was certified in June 2000 as one of two non-Japanese Senior Grandmaster Black Belts in QFD by Dr. Yoji Akao, founder of the QFD methodology. Recent publications include a chapter written in Japanese on TRIZ (Theory of Inventive Problem Solving) in a new book on Problem Solving in QTM published by JUSE. Current projects include developing for the QFD Institute the QFD Body of Knowledge and a series of training courses for certification. Progress will be reported on www.qfdblackbelt.net. Last year’s QFD program for the Queensland Manufacturing Institute in Australia and New Zealand continues, and is being offered in several other countries including India, Turkey, England, Germany, Saudi Arabia, and Mexico.
Adjunct/Visiting Faculty Focus

Daniel Stainforth, desta@mindspring.com

Daniel Stainforth retired in 1998 after a 39 career with Delphi Automotive Systems. He was worldwide director of manufacturing operations for the Delphi Energy Division where he led a comprehensive and systematic process of transformation to lean manufacturing. John Shook and Mike Rother provided key parts of that process. The successes at Delphi led Dan to begin teaching Manufacturing Strategies (IOE 425) at the University. In addition, Dan, while mostly retired, continues to teach "Leading the Change to Lean", a seminar for the Center for Professional Development which attracts leaders from many industries as part of the lean certification program. Also, Dan does limited consulting for several companies involving coaching or advising (as a sensei) of individual leaders or small groups.

Nicholas Steneck, nsteneck@umich.edu

Nicholas Steneck joined the faculty of the College of Engineering in 1996 as Adjunct Professor of Ethics in Industrial and Operations Engineering with primary responsibility for implementing the ethics thread of Curriculum 2000. He has been a faculty member at the University since 1970, with his primary appointment in LSA as Professor of History specializing in the history of science and technology. His current scholarship is divided between research policy, including ethics, and engineering ethics, with occasional talks and short articles on the history of the University of Michigan. Portions of his engineering ethics work will shortly be on line through an interactive webpage: ref.engin.umich.edu. Anyone interested in talking about ways to introduce ethics in the engineering curriculum or to talk about teaching research ethics at the graduate level should get in touch with him at the e-mail address above.

Dan Reaume, daniel.reaume@gm.com

Dr. Daniel J. Reaume is a senior research engineer with the General Motors Enterprise Systems Laboratory and an assistant adjunct professor at the University of Michigan. Dr. Reaume's Ph.D. and M.S degrees are from the University of Michigan in the area of Industrial and Operations Engineering. His dissertation is entitled "Efficient Random Algorithms for Constrained Global and Convex Optimization". In addition to optimization, his research focuses on system modeling and decision analysis. Dr. Reaume's teaching activities at the University of Michigan have concentrated on application development for data processing.

Timothy P. Roahdes, TRoahdes@appliedsafety.com

Dr. Roahdes has taught safety management as an adjunct assistant professor since 1995. He is also a co-founder of Applied Safety and Ergonomics, Inc. in Ann Arbor. His research, consulting, and professional interests encompass a variety of topics within ergonomics, productivity, and health and safety. Dr. Roahdes serves on the Standards Development Committee for the American Society of Safety Engineers (ASSE), which oversees the development of seven standards committees and appoints ASSE representatives to over thirty consensus standards committees. Dr. Roahdes and his colleagues recently completed a major project developing more uniform labeling for personal watercraft (e.g., Jet Skis, Waverunners, etc.), developed a personal watercraft rental checklist for the National Association of Boating Law Administrators (NASBLA), and they have begun work on a project on personal flotation device labeling funded by the U.S. Coast Guard.
Ronald L. Turkett, ronaldlturkett@mediaone.net

- Adjunct Lecturer IOE Department : IOE 425 and CPD Accelerated Six Sigma Classes
- BME Kettering University, MSIE Wayne State University
- Frequent speaker and conference co-chair for U of M Management Briefing Seminars
- President and Principal Ann Arbor Consulting, LLC
- Former Director of Delphi Automotive and AlliedSignal for global Lean Manufacturing Deployment
- Former manager for Toyota Mfg, responsible for program management, production planning, and productivity
- Consultant to Ford Motor in original development of Ford Production System at Cleveland Engine
- GM experience in production engineering, production management, quality and materials management
- Recently coauthored with Walt Hancock "Maintenance Staffs - Size Them Right" for IEE Solutions
- Married, three children, resides in Plymouth, MI.

Jan Vecer, vecer@engin.umich.edu

Prof. Vecer teaches courses in financial engineering. His research interests include option pricing, term structure models and stochastic optimal control. Recently, he is working on finding optimal trading strategies under various constraints.
Accenture/IOE Scholarship
Brian Johnson
Matthew Rudnick

Goldberg/Accenture/IOE Scholarship
Kristen Hunter

Alpha Pi Mu Outstanding Teaching Award
Yili Liu

APM Outstanding Graduate Student Instructor of the Year Award
Ufuk Kula

Wyeth Allen Award
Colleen Bryzik

Outstanding Undergraduate Student
Keisha Strong

Outstanding Graduate Student
Robert Feyen

CoE Distinguished Leadership Awards
Undergraduate
Jeanine Chan
Aimee Constantine
Kristina Inman
Brian Netter
Keisha Strong
Kristin Witt

Graduate
Jennifer Karlin

Vulcan Award
Brian Netter

CoE MLK Spirit Award
Jeanine Chan
Keisha Strong

Arlen Hellwarth Award
Jeanine Chan

Hugh Rumler Prize
Jeanine Chan

Congratulations!!!
We would like to thank the following alumni and corporations for supporting us during our building renovation and expansion. Your financial pledges have made the project a reality. However, we are still in need of your financial support to continue the endeavor. And, as always we have other needs such as student fellowships and scholarship support and equipment to allow students and faculty to make the most from their research.

Remember that you may take full-market value deductability for appreciated assets, and that many corporations offer matching funds. The last page of the newsletter has been provided for your convenience in mailing a donation. We appreciate your continued support!

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This news is from alumni responses to the last newsletter. We’d love to hear from you! Please use the response form to drop us a line and tell us what you are doing. Remember to include any name or address changes.

Jim Pappas (BSE ’95) is promoted to Associate of Financial Services Strategy Practice of Booz-Allen & Hamilton, based in New York, specializes in retail banking strategy for emerging markets.

Tom Bupp (BSE ’97) completed first year at JCI as the ME in the GM focused factory in 1999.

Roger C. Jensen (MSE ’77) is now an Assistant Professor at Montana Tech. in the Safety, Health and Industrial Hygiene Department.

David S. Lundeen (BSE ’84) is now a venture capital partner in $100 million private equity firm based in Mountainview California; with offices in Seattle & Austin Texas. David is interested in good business plans and buyout opportunities in the Michigan and great Lakes area.

Jose Antonic Israel (MSE ’98) is the Operations Engineering Manager at Laboratorios Gutis at San Jose, Costa Rica. He is currently participating in the design of a new warehouse and production facility.

Wei-Wang Chen (PHD ’96) is working at Everlight Chemical, Taiwan as the R&D division manager.

Adil Haque (MSE ’98) is a consultant in Mckinsey & Company.

Robecca Branson (MSE ’92) is now the Vice President of Threaded Rod Co. Inc at Indianapolis, Indiana.

Doug Donaldson (BSE ’92) is a Healthcare Consultant at Arthur Anderson LLP. He had received his MBA in 1997 from Duke University and married Wendy Weblin in 1998.

John Christiano won the 2000 Best Dissertation Award for INFORMS Technology Management Division. (Jeff Liker, Chair, giving award)
RESPONSE FORM

For Alumni History, Future Newsletter Items, and Offers to Assist the Department

The Department and your fellow alumni would like to know where you are, what you are doing and any other news you’d like to share. We invite you to return this form so that we may include this information in future newsletters.

We also welcome any contributions of time or funds. Use this convenient form for such purposes. Also, recently, you should have received a solicitation form from the College of Engineering requesting a year end tax contribution. For the IOE Department to be credited with your contribution, you must designate “IOE Department” on any pledge or contribution sent to the College or University. (Note: Michigan residents receive a particularly large deduction on the first $500 donated)

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Industrial and Operations Engineering
University of Michigan
1205 Beal Avenue
Ann Arbor, MI 48109-2117

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_____ Speaking about your profession at an IIE/APM/VIBES luncheon
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_____ How your company can sponsor research
_____ How you or your company can financially assist the department

Enclosed is $ ____________ for the general support of the educational programs in Industrial and Operations Engineering.
(please make checks payable to “The University of Michigan”)

Back Cover Photos:
Top: TMI Students working in their summer project. (Michael Schimpf Photography)
Bottom: Ergonomic Students studying human motion. (Richard Hinneisen Photography)
Right: Research on ergo keyboard. (Richard Hinneisen Photography)

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