Inside this Issue: Special Features on IOE's Return to its Roots in Manufacturing.
The name IOE was adopted to broaden the field beyond traditional Industrial Engineering which focused on manufacturing. This was certainly a legitimate and worthwhile thing to do, and the tools and methods we teach are certainly useful beyond the manufacturing realm. But as we moved into service operations like hospitals, criminal justice, and air travel, I do not think any of us would have predicted the renewed emphasis on manufacturing we have seen in the 1990s. In this issue we highlight a number of major initiatives focused on IOE’s role in manufacturing.

—Dr. Jeffrey Liker
Crash, boom, bang! Students, staff and faculty of the IOE Department have had their fill of these sounds over the past two years of construction and renovation. Our long process of transformation is now almost over. The Lurie Engineering Center and IOE addition were dedicated on October 18. The IOE renovation should be completed by early 1997.

The IOE addition houses our first classrooms on North Campus, the Ford Lecture Hall and the Chi Systems Classroom. For the first time in the past 10 years, students can talk with faculty on their way to class without making a substantial detour to the IOE building. Students can also visit the graduate and undergraduate program office by simply crossing the hall from their lecture. When our renovation is complete, access will improve even more.

The IOE addition also offers new offices and laboratories for the Center for Ergonomics and the Department’s first CAEN (Computer-Aided Engineering Network) laboratory. The laboratories include expanded instructional labs with new capabilities for introducing students to work measurement and human factors. The IOE renovation will also provide expanded laboratory capabilities for Jan Shi’s process improvement studies.

Beyond our physical changes, the IOE Department has continued to grow in student numbers, in undergrad and graduate students, as well as students from other engineering departments and across the university. The Department continues to enjoy high national rankings, including first place in the Gourman graduate program rankings, third place in the US News and World Report rankings for both undergraduate and graduate programs, and third place in the National Research Council rankings of doctoral program effectiveness.

The IOE faculty have received numerous honors during the year. The Department was, for example, instrumental in the College of Engineering’s first ever success in winning a National Science Foundation (NSF) Engineering Research Center grant (see page 6). Izak Duenyas and Jan Shi were honored with the prestigious NSF CAREER Award for outstanding junior faculty. Many other faculty received federal and industrial grants despite reduced budgets and increased competition.

Increasing student numbers have caused increased pressure in meeting student needs. The IOE Department was fortunate this year to add Shane Henderson (see page 6) to our roles. We will, however, miss Walt Hancock who is entering into retirement in 1997, but are heartened that Walt will continue to be active in the Department.

Among other activities, the IOE Department is continuing its curriculum revision by identifying courses with their key skills (as in last year’s newsletter). I thank those of you who sent me your suggestions and comments on the faculty’s list. That material has been combined with other sets of skills to produce rough plans for a new curriculum that we hope to unveil sometime in the next year.

We in the IOE Department recognize that our success in national polls and competitions is only possible through your accomplishments. I hope you can visit and tell us of them either in person or electronically (http://www.engin.umich.edu/ioe/). As always, I encourage you to send me (jrbirge@umich.edu) your thoughts and look forward to hearing from you.

—John R. Birge, IOE Department Chair
Yavuz A. Bozer served as the Acting Director of the Program in Manufacturing (PIM) during 1995. PIM grants two professional, graduate-level degrees in manufacturing: The Master of Engineering (MEng) degree and the Doctor of Engineering (DEng) degree. The MEng degree is designed to be completed in one year on a full-time basis; the course work is distributed between engineering courses, business school courses, and a summer project that involves full-time work at a production site. The summer project is conducted in a team setting; it may be performed either through the Tauber Manufacturing Institute (TMI), which will find an appropriate project for the student and provide faculty advisors from the Engineering College and the Business School, or the student may choose to perform the project at his/her place of employment subject to approval by the PIM Director. The DEng degree is intended for individuals who are seeking knowledge at the Ph.D. level but with the intent of applying it on the factory floor. It involves a dissertation geared towards a relevant, industrial problem in manufacturing. Also, one member of the dissertation committee must be a qualified individual from industry. Both degree programs, MEng and DEng, call for a minimum of two years, full-time industrial experience in a relevant area as part of the admission requirement. The Program offers financial aid to a number of qualified applicants who submit GRE scores.

Prof. Bozer is also the leader for the Factory Optimization and Control Thrust Group at the Center for Display Technology and Manufacturing (DTM) at the University of Michigan. The Center for DTM is a multidisciplinary research center that involves the Electrical Engineering and Computer Science department, the Industrial and Operations Engineering department, and the Chemical Engineering department, among others. Its primary focus is to study product, process, and factory design issues related to flat panel displays, which play an increasing role in the display of information in a variety of settings including aircraft, automobiles, and laptop computers to name a few. The Factory Optimization and Control Thrust Group has been engaged in a number of research initiatives concerned with factory design (such as capacity planning, factory layout, and materials handling) and factory operation (such as scheduling of batch processors, matching "active plates" with "passive plates" and so on). Professor Bozer and Professor Duenez have also been working closely with the Industrial Design Corporation (IDC) which is now in the final stage of developing a personal computer-based factory design and analysis tool for the United States Display Consortium (USDC) membership.

Jianjun (Jan) Shi is an assistant professor in the Department of Industrial and Operations Engineering at the University of Michigan. He received his B.S. and M.S. in electrical engineering from the Beijing Institute of Technology in 1984 and 1987 respectively, and his Ph.D. in mechanical engineering from the University of Michigan in 1992. Before he joined the IOE Department, he worked as an assistant research scientist for three years in the Department of Mechanical Engineering and Applied Mechanics at UM.

Professor Shi's research interests are the fusion of advanced statistics and engineering knowledge to develop in-process quality improvement (IPQI) methodologies to achieve automatic process monitoring, diagnosis, and compensation, and their implementation in various automotive manufacturing processes. He is one of the first researchers to contribute to the field and has published more than twenty-five refereed papers and produced three Ph.D. graduates. Currently, he is supervising seven Ph.D. students and three M.S. students who are working on IPQI research.

One of his major research programs is entitled "Agile and Precision Stamping Program-Near Zero Stamping (NZS)." This three-year, $18.7-million dollar project is co-funded by the NIST Advanced Technology Program and the Auto Body Consortium. The goals of the project are to achieve submillimeter accuracy in sheet metal stamping and to reduce the time of product development by 30%. Prof. Shi serves as the Technical Director of the program and Project Investigator at the University of Michigan.

Professor Shi also serves as the Associate Director of the S. M. Wu Manufacturing Research Center, which conducts various research projects in automotive body assembly, sheet metal stamping, precision engineering, machine tool and machining, and intelligent manufacturing. As an associate director, Prof. Shi is responsible for projects related to quality improvements, signal processing, and intelligent control. His projects are generously funded by General Motors Corp., Chrysler Corp., the Auto Body Consortium, the National Institute of Standards, and Technology-Advanced Technology Program, and the National Science Foundation. A list of his on going projects includes:

- Signature analysis for sheet metal stamping
- Multi-attribute decision making for die predictive maintenance
- Remote diagnosis and system reliability evaluation
- In-process quality improvement methodology and implementation
- Process capability study for the Chrysler NS program
- Process navigator for the automotive body assembly

Last month, Prof. Shi received the NSF Career Award for his research on “In-Process Quality Improvement Methodologies and Implementations.” With the help of this grant, he will continue his research on IPQI and also develop new courses and research labs in our department.

In addition to conducting cutting-edge research, Prof. Shi also actively serves as an organizer for various conferences, symposia, and workshops. Since Prof. Shi joined the IOE department, he co-organized the first symposium on “Sheet Metal Design and Control in Manufacturing” at the ASME ’95 Annual Conference (San Francisco, Nov. 1995) and served as a member of the program committee for the International Conference on Automotive Manufacturing Technologies (Shanghai, June 1996). Currently, Prof. Shi is organizing an invited session on “In-Process Quality Improvement Methodology and Implementations” for the Sixth Industrial Engineering Research Conference (Miami, May 1997).

**The Engineering Research Center on Reconfigurable Machining Systems**

This year marks the first time after more than ten years of effort that the University of Michigan was awarded an Engineering Research Center (ERC) grant from the National Science Foundation. Yoram Koren in Mechanical Engineering and Applied Mechanics is the Director of this center but the center is a multidisciplinary activity involving numerous IOE faculty. It also has the support of a diverse set of corporations ranging from small machine tool makers to General Motors.

Among the leadership of the ERC, Yavuz Bozer serves on the Executive Committee and Jim Bean is Education Co-Director. These positions build on bridges to the College’s Program in Manufacturing (PIM), where Professor Bozer served as Interim Director, and the Tauber Manufacturing Institute (TMI) where Professor Bean serves as the Ford Co-Director. The TMI link has been especially important for the center in providing links to the business school and experiences that join business and engineering students.

Several research focus areas within the ERC also involve IOE faculty. Jan Shi is actively pursuing work on remote diagnosis and reliability as part of the design and manufacturability area while the systems and integration area is led by John Birge.

The systems area of the ERC focuses on those aspects of reconfigurable machining systems that bridge across engineering disciplines. Two projects in the area involve substantial numbers of IOE faculty. Chip White leads the multi-attribute decision making area which involves Tava Olsen and Steve Chick, while John Birge leads the life-cycle economic project including Izak Duenyas and Rachel Zhang. The goal of each of these projects is to enable efficient selection of reconfigurable machining systems so that response times to customer demands are reduced, quality is maintained or improved, and overall time to market is shortened. These projects were the most warmly received of all ERC proposals and involve over 10 industry partners who are contributing time, effort and funding for research support.

Overall, the ERC is working to create a new paradigm for manufacturing in which machines are easily modified and updated as market demand and supply (in the way of new technology) change rapidly over time. The goal is for the ERC to continue to improve manufacturing’s capability to respond quickly to changing consumer demand and technology with high quality products.

**–JOE Goes Lean**

A number of years ago Walt Hancock introduced a course into the IOE curriculum on lean manufacturing. It is called “Manufacturing Strategies” (IOE 425). The course focused on the Toyota Production System and in addition to lectures included plant tours and critical assessments by the students of how the plant stacked up through the sense of lean manufacturing principles. The course quickly became one of the mostly highly rated courses by students. Due to bus sizes for the tours Walt placed a constraint of a 50 student maximum on the course. Soon students were lining up to get into the class which went from one offering per year to twice per year to twice per semester. Walt called on an old
friend and former Ford Manager Don Jahncke to teach a section and his classes were also highly acclaimed.

Lean manufacturing as embodied by the Toyota Production System seems to naturally make sense to IOE students. IOE students have two characteristics. First, as engineers they appreciate logic and order. The emphasis of lean manufacturing on stand-ardized work, continuous flow, workplace organization, balanced production lines, and consistent quality all resonate with engineering sensibilities. Second, unlike other engineers IOE students are generally interested in management of the human side of organizations. Lean manufacturing is based on the premise that employees are a company's most valuable resources and should be trained, empowered, given secure jobs, and treated with respect.

Since the launch of IOE 425 we have been building on our work in lean manufacturing. Two years ago the Japan Technology Management Program hired two individuals to contribute to outreach and work in lean manufacturing. John Shook was hired from Toyota Motor Company. John was the first American to make manager in Toyota in Japan and came to the U.S. to help in the start up of Toyota's joint venture with G.M. (NUMMI). He also participated in the start-up of Toyota, Georgetown and the Toyota Supplier Support Center (TSSC). TSSC focused on helping American suppliers introduce the Toyota Production System. Mike Rother was hired from the Industrial Technology Institute where he and an associate had started the concept of Continuous Improvement User Groups. These groups brought together 5 or 6 small companies which lacked the resources to hire highly paid lean manufacturing consultants. Instead they pooled their resources and met monthly on the shop floor of each company's plants. Each month they learned a lean lesson and tried to apply it on the shop floor. Thus, they were able to learn by doing.

Mike and John have been co-teaching IOE 425 and will continue the legacy left by Walt who is retiring this year. Building on this foundation they held this past summer the "Second Annual Lean Manufacturing Conference" in Detroit. The topic was: "Are We Lean Yet?" Representatives from the Big-3 and automotive suppliers discussed where they are on lean manufacturing and what still needs to be done. James Womack, one of the famed authors of The Machine that Changed the World gave his view of what is left to be done. The conference was attended by over 200 people from government, universities and industry.

Both Mike and John are halftime at U.M. and halftime consulting and they have found ways to involve students in their consulting activities as well giving students first hand experience as companies attempt to transform traditional mass production to lean manufacturing.

This teaching and practice of lean manufacturing is also being accompanied by active research. Jeffrey Liker is editing two books on the implementation of lean manufacturing:

REMADE IN AMERICA: TRANSPPLANTING AND TRANSFORMING JAPANESE PRODUCTION SYSTEMS, Edited by Jeffrey Liker, University of Michigan Mark Fruin, University of British Columbia Paul Adler, University of Southern California, Forthcoming, Oxford University Press.


This activity promises to grow over the years to the point where U.M. will be seen as the place to go for expertise on the practical implementation of lean manufacturing principles.

Last summer 10 U.M. faculty were given a first hand look through a one-week study mission to Japan that John and Mike organized which included visits to Toyota, Toyota suppliers, Honda, and Sony.
New Master's Programs

--Occupational Ergonomics

Poorly designed workplaces prevent workers from performing at their full potential and contribute dramatically to work-related stress, injury and illness. Work accidents and overexertion injuries (strains and sprains) cost U.S. employers over $500 billion annually. In some operations, workers' compensation insurance expenditures reach 10%-20% of wages and benefits. Due to aging of the U.S. labor market and continuing inflation in medical costs, these costs are expected to increase as we move toward the 21st century.

Ergonomics is recognized as an effective approach in addressing this challenge. The IOE Department is now offering a Master of Engineering in Occupational Ergonomics (M. Eng. in O.E.). Courses offered by IOE and other departments allow students to develop advanced knowledge and skills in applying life sciences (e.g. anatomy, physiology, psychology) to the design of user-friendly facilities, work stations, tools, and work methods. In addition to formal courses, all M. Eng. in O.E. students must complete a project involving the analysis and design of a human-hardware system in an operational manufacturing or service setting.

With their base knowledge and analytical skills regarding human traits, capabilities and limitations, Ergonomic Engineers will be able to design systems that simultaneously protect human resources and enhance system outputs such as productivity and quality. For more information on the M. Eng. in O.E. program, see our web page at: http://www.engin.umich.edu/dept/ioe/C4E/programs/occ_erg.html.

--Financial engineering

The explosion in information technology and our ability to use that technology for decision making has led to rapid increases in the use of quantitative techniques in financial services. IOE graduates are entering banking, insurance, corporate, and public financial institutions in record numbers. In response to these growing needs, the IOE Department through John Birge and Visiting Assistant Professor Vadim Linetsky has been instrumental in creating a new interdisciplinary Master of Science in Financial Engineering (MSFE).

The goal of the MSFE is to give graduates the essential skills to enter this lightning paced field. The program includes core IOE skills such as engineering economics, capital budgeting, optimization, stochastic processes, and statistics along with investments and international finance from the Business School, financial mathematics and numerical methods from the Mathematics Department, data analysis from the Statistics Department and elective courses from other areas such as economics, electrical engineering, computer science, and physics.

Currently the MSFE program is developing a laboratory in the new Media Union on North Campus complete with state-of-the-art workstations, a wide range of financial analysis software, and real-time connection to the world markets. With these advanced tools, the laboratory will give students the opportunity to develop new applications and to apply them in the environment of a modern trading room.

The MSFE program is scheduled to receive formal approval at the Michigan Presidents' Council Meeting in January 1997 with several current dual degree students starting the program at that time. Further information on the program can be found on the World Wide Web at http://www.umich.edu/~fep.
New Master's Programs

-Master of Quality Engineering Degree (MQE)

The Master of Quality Engineering is a thirty credit-hour professional degree program that focuses on application of engineering and statistical principles to the continuous improvement of consumer products and service systems. It will be a tape-delay educational experience for the off-campus students. The need to continuously improve is stimulated by attempts to meet consumers increasingly higher needs to be able to purchase worldwide products and services that are defect free and which will function reliably throughout their useful lives. Starting in the early 1980's, many companies and businesses initiated programs to improve the quality of their products and services. As these efforts have matured, it has been increasingly realized that quality improvement requires the engineer to effectively extract from data sources of variation and then to use his/her engineering background to understand and minimize the variation, defects, or lapses in service. Businesses in Michigan, heavily involved in these activities, have a need to provide their employees with quality-engineering programs that are timely and easily accessible. Major service organizations, especially hospitals, have total quality management (TQM) programs which require the same underlying technology base for optimal continuous improvement.

Much current quality engineering education is presently being met by in-house and short-course programs (for example, at Eastern Michigan University and American Supplier Institute). Most of these programs lack the depth or breadth of our proposed program and do not result in advanced degrees. Georgia Institute of Technology offers a tape-delay TV master's program in industrial engineering which has some quality engineering in it. Iowa State offers a TV master's program in statistics which covers the statistics and probability aspects, but does not integrate data analysis and engineering to the level of the proposed program. The IOE Graduate Program office receives numerous calls from full-time employees inquiring about evening courses and master's programs which can be pursued while being employed full time. Our estimate is that the proposed program will, after two years, have 50 tape-instruction students enrolled. In addition, we estimate that 50 non-degree students will take the quality-related courses via tape, and 10 students will be enrolled on the Ann Arbor campus.

Many contemporary [undergraduate and graduate] engineering programs do not provide students with sufficient ability to improve products, processes, and services where product variation exists. Some companies (particularly General Motors Corp.) are attempting to fulfill continuing educational needs of their employees by contracting with educational organizations who have promoted tape-delay TV education. The major players are Purdue, Stanford, RPI, University of Massachusetts, Northeastern University, Columbia University, and Georgia Tech. None of these programs offer a quality-engineering degree, so we are not competing on that basis. However, we are competing on a nationwide basis for the remote-learning market. The Purdue, Georgia Tech, and Stanford programs are very successful. All three have contracts with the GM Tech Center, with Purdue and Georgia Tech offering graduate engineering master's degrees without a residence requirement.

The College of Engineering Continuing Education Center will contract with various business firms nationwide for this program with agreements that will stipulate the presence of monitors who can respond to questions during the tape presentations and who can administer homework and examinations. The program is not for individuals who are not part of a contracted group, except students who attend the classes in Ann Arbor.
—Tauber Manufacturing Institute

The Tauber Manufacturing Institute (TMI) is a joint venture between the College of Engineering, School of Business and industry to support industry-relevant, teaming approaches to manufacturing education and research. It involves students from several degree programs in Engineering and Business. IOE undergraduates are involved through the Engineering Global Leadership Honors Program. Joint MBA/MSIOE students have been involved since the program began in 1993. Starting this year, MSIOE students have been invited to apply. Currently 44 IOE students are in TMI.

The cornerstone of TMI is the summer team projects. Cross-disciplinary teams of two to four students from Engineering and Business, with faculty advisors from each unit, take on highly challenging, real projects in industry. For example, last summer IOE student, Kwok Poon, and a team of MBAs worked in China to develop a logistics plan for a new Allied Signal plant. Next summer 71 students will be involved in at least 22 projects.

On the research front, TMI funds the TMI Faculty Fellows program. Teams of faculty from Engineering and Business carry out cross-disciplinary research with an industry partner. Currently, Professors Liker, Hancock and Duenyas hold TMI Faculty Fellowships.

For further information, contact James Bean, the Engineering Co-director (313-763-1454), or Jolene Glaspie, North Campus Administrator (313-647-5486).

—The Japan Technology Management Program

This program was established in 1991 to help American industrial managers learn how the Japanese manage technology, and to educate students in Japanese language and culture so they can ultimately do business with the Japanese. JTMP is now starting its sixth year at the University of Michigan. JTMP continues to be a cooperative undertaking between the Center for Japanese Studies and Department of Asian Languages and Cultures in Literature, Sciences and Arts, the College of Engineering and the School of Business Administration. We continue to do research, provide scholarships for technically-oriented students to learn Japanese, send students on internships to Japan, and sponsor an advanced course on technical Japanese.

This year the emphasis of the program has shifted further in the direction of Japanese manufacturing methods applied in the United States. This coincides with a decision to make John Shook, formerly of Toyota and now halftime in IOE, the Director of the Japan Technology Management program (see article in this issue— IOE goes lean). The co-directors are Jeffrey Liker, IOE, John Campbell, Political Science, and Brian Talbot, Business Administration.
Program Updates

-Center for Ergonomics

The 40 students, staff and faculty associated with the Center continue to study how materials handling systems, handtools, vehicles, keyboards and other devices used by people can be improved through application of ergonomics principles and methods. The work in the Center is sponsored by Ford, Chrysler, PPG, Johns Hopkins University, Sea River Maritime, AMP, and Pepsico Food Services, as well as grants from the Department of Commerce for the State of Michigan, Whitaker Foundation, NIOSH and NIH. During the past year, over 1200 practicing engineers, designers, managers and health and safety professionals have attended short courses (2-5 days) to learn about the research in the Center. Please call 313-763-2243 for a brochure describing the Center or visit our web page at: http://www.engin.umich.edu/dept/ioe/c4e/.

-Two Centers of Transportation Research

Through Professor Chelsea White IOE has a leadership role in two major research centers within the college of engineering related to transportation. First, Chelsea White is Director of the Michigan Research Center of Excellence which is one of three competitively selected Research Centers for Excellence established to provide Intelligent Transportation Systems (ITS) research solutions, promote ITS technologies and provide professional development to prepare ITS professionals to design, build and operate intelligent transportation systems. Michigan has gained support from fifteen private firms and public agencies including automakers, electronics and computer manufacturers and transit fleet operators. The Center developed the ITS Policy Exercise which is a strategic planning exercise for ITS which assists policy leaders and stakeholders in determining how to plan and implement ITS, while considering real world political, economic and environmental constraints. The ITS educational laboratory has provided support for 42 faculty research staff and students. The Intelligent Cruise Control project has exposed the nature and frequency of driving conflicts likely to be encountered with “Adaptive Cruise Control (ACC)”. The Center has developed a low cost solution to most universities. This project enables schools without large budgets to conduct ITS human factors research studies which might otherwise not be performed. The RCE published approximately 54 papers and gave about 16 conference presentations last year.

In The Center for Ergonomics testing is done of human-machine interactions. To ensure experiments are unbiased, even those who support other universities are used as subjects.

Second, Chelsea White is a co-director of The Alfred P. Sloan Foundation funded center of trucking research. Sloan awarded the School of Business Administration, in partnership with the College of Engineering, a three year, 2.2 million dollar award to study diverse aspects of the U.S. trucking industry. Established in April of 1995 and better known as UMTIP, the University of Michigan Trucking Industry Program will seek to find ways the trucking industry can better serve American businesses through improved economic competitiveness. UMTIP is a multidisciplinary program which includes economics, business administration, urban planning, industrial and operations engineering, civil and electrical engineering, human resources, and the University of Michigan Transportation Research Institute. The program also includes participants from Cornell University, the University of Massachusetts, and the University of Wisconsin at Milwaukee, as well as UM faculty, researchers and students.

Interestingly, 80% of the revenue generated by the movement of freight in the United States is earned by the trucking industry. With this fact in mind, the goals of the program examine the impact of economic competitiveness, safety, congestion, mobility, environmental impact and energy efficiency as well as regulation, technology and labor, and human resources of the industry. The program also explores the trucking industry's potential for providing high-quality, well-paying jobs and attracting a quality work force and to build a permanent, recognized center for research and teaching which specializes in trucking service industry issues.
Walton Hancock will officially retire as of the end of the Fall semester. Undoubtedly almost everyone reading this newsletter knows Walt and probably had him as a Professor at some point. Then you will not be surprised that he remains very much on active duty and will be a regular at the office he retains within IOE. You also know that Walt is truly an extraordinary academic and engineering leader. After receiving his Doctor of Engineering in Industrial Engineering from The Johns Hopkins University in 1954, Walt served as Director of Industrial Engineering and Manager of Quality Control at the Lord Baltimore Press Company and then joined the faculty at the University of Michigan in 1959. His pioneering studies of direct labor planning, in the 1960’s, expanded the scientific basis for the Methods-Time-Measurement System, the most prevalent method of predicting staff time requirements in industry throughout the world. One of his many pioneering contributions to classical industrial engineering was the “learning curve,” a statistical method for forecasting how quickly workers could be expected to learn new skills.

In the 1970’s, Professor Hancock was one of the few engineering academics concerned with cost containment within the health care industry and he was able to demonstrate the utility of industrial engineering methods in hospital settings. He demonstrated conclusively, by using advanced industrial engineering tools, how various patient scheduling schemes affect hospital staffing requirements. He also described how surgical units could use industrial engineering methods to improve patient care and efficiency. His work in health care led to a joint faculty appointment in the Michigan School of Public Health, two highly regarded books, a series of short courses for practicing industrial engineers in hospitals, and a joint master’s program in IE and Hospital Administration. These days one can visit most any major hospital and find a management engineering department. Most likely the existence of that department can be traced in some way back to Walt through his many graduates who quickly became leaders in this field.

In the 1980’s, Walt saw that the hospital field had matured quite a bit and decided he could make a greater contribution to the field of quality assurance in manufacturing systems. Very quickly he demonstrated how multivariate statistical models could be used not only to control manufacturing processes, but also to design new tooling, fixtures, and machines to assure higher quality. These concepts have been adopted by many plants in Chrysler, Ford, and AMP Inc. and his many Ph.D. students have become among the leaders in this field.

In 1984, when he became the Engineering Associate Dean for Manufacturing Systems, he facilitated the development of a manufacturing oriented, multidisciplinary education and research environment within the University of Michigan’s College of Engineering. He also established an annual symposium for practicing engineering and manufacturing managers concerned with designing manufacturing systems for total quality. This symposium has been attended by over 2000 participants. His leadership in this activity led to his receiving the first endowed William Clay Ford Chair in Product Manufacturing in 1989. He also became very interested in lean manufacturing and created a course on this topic, “manufacturing strategies,” which is among our most popular elective courses in IOE.

Professor Hancock served as Chair of the Industrial Engineering Department for six years, during which time the department rose to among the top three ranked departments in the country. Before and since, he has been a driving force in a wide variety of departmental administrative and curriculum initiatives. He chaired or cochaired 34 Ph.D. Theses Committees. Many of his graduates now serve as chairs of other IE departments, research directors, or executive officers in major companies. Besides coauthoring three books, he has published 72 peer-reviewed journal articles, 15 book chapters, and over 90 technical reports.

For his scholarship and academic leadership, Professor Hancock has received awards from the Institute of Industrial Engineers, the Society of Automotive Engineers, and the Society for the Advancement of Management. He was honored by the College of Engineering in 1981 as the recipient of the prestigious Stephen S. Attwood Award, “In recognition of continued distinguished achievements in engineering teaching, research publication, and service to the engineering profession.” He certainly has served us well in I.O.E. and we expect his leadership to continue to influence our activities in the future in many ways.
Alumni Society Merit Award

The University of Michigan College of Engineering Alumni Society awarded J. Dann Engels the Industrial and Operations Engineering Alumni Society Merit Award at the College's annual Alumni Society Awards Dinner on October 18, 1996. More than 200 people attended the recognition dinner held in the Michigan League at the University of Michigan.

The Alumni Society Merit Awards were established to honor alumni who personify the College's tradition of excellence and who have achieved significant accomplishments in their professional life. The Award is given to one alumnus from each of the eleven academic departments within the College. Recipients are selected by departmental committees whose members are chosen and headed by the department chair.

J. Dann Engels earned MSE degrees in both industrial and operations engineering and mechanical engineering from the University of Michigan in 1980. He has been a registered professional engineer since 1983. He also earned his BSE in Industrial and Operations Engineering from the University of Michigan in 1978, and a BS in letters and engineering from Calvin College in Grand Rapids, Michigan, his home town.

Mr. Engels founded The Waypointe Companies in 1988 as a business entity through which he could further develop three of his primary professional interests: engineering, international trade, and software technology. Today, The Waypointe Companies employ more than 300 full-time employees in the U.S. and Asia and are experiencing a current annual growth rate exceeding 50 percent. Waypointe enjoys a growing reputation for leadership and innovation in offshore software development and opening Asian markets for U.S.-based corporations.

During his last year at the University of Michigan, Mr. Engels was an associate scientist at Vector Research in Ann Arbor, and, following graduation, he returned to Grand Rapids and joined a consulting engineering firm. In 1983, however, his entrepreneurial spirit led him to create the Engels Corporation, a software and engineering consultant firm and subsequently, The Waypointe Companies.

Mr. Engels' philanthropic interests spurred him on to create The Waypointe Foundation which provides educational opportunities for promising young people who might otherwise be denied the chance for college and graduate training.

Mr. Engels is a member of the Young President's Organization, the National Society of Professional Engineers, the Michigan Society of Professional Engineers, and the National Steering Committee of the Campaign for Calvin College.

J. Dann Engles (center) receives the 1996 IOE Alumni Society Merit Award from the College of Engineering National Advisory Council's Richard Heglin (left) and IOE Department Chair John R. Birge.
Outstanding Alumni’s Reflections

Dann Engels was honored in 1996 with an outstanding alumni award (see previous article) and was invited to give a speech in the IOE department. The following is the text of his speech.

"With Appreciation for Lessons Learned"

There is a rich tradition at colleges and universities of inviting alumni of "distinction" back to the campus, putting them in front of students, and encouraging them to inspire the students with dramatic stories recounting their successes and achievements. It is my hope to violate that tradition, since students too often come away from such encounters impressed only by the breadth and depth of the speaker's ego. I'd much rather "turn the tables" on this tradition, and admit instead my own shortcomings and limitations — and my surprise at this honor conferred on me. If there is any honor due, it is due my professors who, perhaps unknowingly, stirred something inside me and most of my classmates — curiosity, courage and, eventually, maybe even competence. This event is not about personal accomplishment. In my view, it is rather about my profound appreciation for the lessons I learned here at Michigan — many of them in spite of my own inattention.

This is an extraordinary institution with a proud tradition of excellence — both at the undergraduate level and in the graduate programs. It is a source of pleasure for me that my department — the School of Industrial and Operations Engineering — is routinely ranked among the Top 5 in the nation. I will forever be grateful — and a little amazed — that I was admitted to this program and educated in such a splendid environment for exploring, questing, learning. My only regret is that the school has not yet made it possible to fulfill my dream to serve as an assistant offensive coach on the football team, although the way things have gone this year my ambition may not be as farfetched as it seems. It's probably useful to remember — despite the joy we all experienced when the Wolverines spent most New Year's holidays in sunny Pasadena — the wise observation that "Big 10 football is related to academic excellence in the same proportion as bullfighting is related to agricultural advancement." It is the academic excellence that stands out for me.

I grew up as the son of a plumber who worked long hours to put his kids in private schools from grade school through my first three years of college at Calvin, in my home town of Grand Rapids. It was a solid educational foundation, despite the provincial impulses of the Dutch in Western Michigan. Coming east to Ann Arbor was a step out of a safe, well-run, ethnically homogenous environment and into a bigger world — a world of bigger ideas, infinite possibilities and delightful differences. It was at Michigan were I was introduced — in an intriguing way — to the concept of risk. I learned that not to risk is not to live — and I learned that accepting risk is a way to endure failure. Michigan prepared me not merely for success, but also to survive failure. It is one of the greatest gifts a teacher can give to a student. The curriculum and the faculty conspired to instill wisdom and values that allowed me to embrace risk, pursue adventure and experimentation and to always invest in people more than projects. I learned then — and I've discovered this even more in subsequent years — that sometimes this will break your heart — and your wallet — but it's how the world works best and it's the way progress is achieved.

Michigan was a place for me to learn some very simple rules through some very profound lessons. It was a place for me to discover how many heroes haunted the classroom. In my heart, I have a Wall of Honor for my heroes. Some of them still walk among us; others have moved on. But all of them were important to me. Walt Hancock introduced me to organizations — how they work and don't work. Stan Seashore, one of the world’s leading thinkers on organizational design, influenced how I think, to this day, about companies and human beings who are part of those companies. John Bartholdi taught me about optimization, meaning doing the best you can with what you have. He took us through objectives, constraints, resources. I use his ideas every day. Steve Pollock was
Outstanding Alumni’s Reflections (cont...)

the original Forrest Gump. He taught us that life really is like a box of chocolates and that you can never be sure what you’re going to get. Life is full of conditional relationships and uncertainty. From that base, I built a strong conceptual framework both for engineering and for entrepreneurship — ultimately, it often comes down to probabilities, a good bet. Peter Cherry made decision analysis fun. I soaked it up and every time I have to make a decision today — which is several times a day — I still use the framework he taught me for outlining my options. Frank Noonan began unlocking the mystery of finance for me. I still occasionally go back to the textbook Professor Noonan used, Engineering Economy. I owe him a great deal for that one semester of enlightenment. Don Chaffin taught me human factors. He showed us how the design of work is critical to how people perform their tasks. He helped me understand that if a company cares about its people, it must invest in their tools and in their work environment. This has greatly helped our business build employee loyalty, trust and satisfaction. Gary Herrin taught me statistics and design of experiments with grand intensity and enthusiasm. It has been a tremendous competitive advantage since most business executives really understand very little. Tony Woo forced me to create a software package to run all aspects of a grocery store. The project almost killed me. I spent many nights — all night long — in the data center with those darn punch cards. But Tony taught me about computers — the basis of how they work. And that has made all the difference. I’ll be forever grateful for the pain of that programming class with Tony Woo. He helped me see the future. And, finally, one of my adjunct professors, Seth Bonder, gave me a part time job at Vector Research in Ann Arbor. He taught me other valuable lessons including this one: No matter how bright you are, no matter how good your idea, if you don’t present the material properly, brilliance can be wasted and ideas lost. Preparation is essential and drill until you drop taking nothing for granted.

So what made these people heroes? These men became heroes to me simply because they followed their life calling. They did what they do best. They taught, whether I learned or not. And so did what most people will never do: make a difference. Students at a place like Michigan have both an opportunity and an obligation. This is world-class education — a jewel — and it’s wise to treat it as such. It’s a challenge to take individual responsibility, to be a builder, to be constructive. It’s easier to be an observer, and a critic. But remember the indictment of critics by Brendan Behan: “Critics are like eunuchs in a harem: they know how it’s done, they’ve seen it done every day, but they’re unable to do it themselves.”

I have, in my own inadequate way, attempted to emulate my professors, my heroes. I’ve attempted to discover what I do best, and to follow my passion. I remember well the powerful declaration of the Danish philosopher Soren Kierkegaard, who said, “Were I to wish for anything I would not wish for wealth or power, but for the passion of the possible, that eye which everywhere, ever young, ever burning, sees possibility.” The Waypointe Companies are a result of that belief in the passion of the possible. The businesses that make up the Waypointe Companies deal in software, engineering, construction and international trade, but they are all rooted in my hope that I might build an organization that could do what my professors already did for me — to make a difference. In the Waypointe Companies, there are few rules, but they are worth mentioning: Respect diversity, anticipate change, reward creativity, tell the truth, act with integrity, treat people with respect, exceed expectations, and keep your promises. The vision with which I founded Waypointe was simply this: Build a company where people love their work and share in the profits — and designate a significant portion of the company’s income to charitable endeavors. Through our people, and through the Waypointe Foundation, we are in the business of encouraging people and the communities in which we work and live. The vision, I hope, puts to rest the image of the “lonely entrepreneur.” I believe that it is only an image. Relationships are essential — and anyone who is truly successful never really goes it alone. That’s why this honor belongs to my heroes — my heroes at Michigan who helped shape me by demonstrating their dedication to make the path bright for others. And my heroes at home — my wife and my parents, who provide the rarest of gifts — unconditional love.

— J. Dann Engels, President

The Waypointe Companies
Dann@Waypointe.com
James Bean continues as Ford Motor Company Co-director of the Tauber Manufacturing Institute (TMI) and advisor to the Engineering Global Leadership Honors Program. He is also Associate Director for Education of the new Engineering Research Center in Reconfigurable Machining Systems. Professor Bean has been researching the mathematical foundations of genetic algorithms and stochastic models of large asset management problems. The latter is funded by two NSF grants and the Sloan Foundation. Professor Bean is co-teaching a cross-disciplinary course on Integrated Product Development with faculty from the Business School and School of Art and Design.

John Birge has been active in developing the new financial engineering program and ERC area in systems and integration (see this issue). He has also continued his NSF projects on stochastic programming and scheduling with Izak Duenyas. He serves as President of the Council of Industrial Engineering Academic Department Heads, which has developed new accreditation criteria for industrial engineering programs (part of ABET 2000). He was also elected Vice President - Subdivisions of the Institute of Operations Research and Management Science (INFORMS).

Yavuz A. Bozer served as the Acting Director for the Program in Manufacturing (PIM) during 1995. He is actively involved in the Center for Display Technology and Manufacturing (DTM) where he leads the Factory Optimization and Control thrust group. He is also a member of the team put together to prepare a PC-based factory design and evaluation tool for the United States Display Consortium (USDC). He serves on the PIM Council and is a member of the Executive Committee for the new NSF-funded Engineering Research Center (ERC) concerned with re-configurable manufacturing systems. Prof. Bozer’s work is concerned with the design and performance evaluation of material handling systems, and planar combinatorial-geometric optimization problems with applications in facility layout, two dimensional bin packing, cutting stock (or trim loss), and storage space configuration.

Don Chaffin, The Johnson Chaired Professor, continues as director of the Center for Ergonomics. His own research, in conjunction with five Ph.D. students and two Post-doctorates, has been concentrated in two domains. One of these is the continuing search for data and biomechanical models to predict manual exertion capabilities for various populations. Recently this work has concentrated on modeling the biomechanical stresses imposed on one’s low back and shoulders when attempting to move objects with different types of hoists and mechanical articulated balance arms. A second area of investigation pertains to how normal human movements can be predicted in a way that allows the development of human animation software. Such software is quickly becoming the major means to evaluate and design new vehicle interior, office and plant-floor workstations, and human motions used in the video entertainment industry.

Paul Green has continued his research on driver interfaces for motor vehicles of the future. Major accomplishments include completion of the first experiment (for Toyota) on the time to read electronics maps, completion of an experiment showing the value of icons for collision warning systems, completion of an experiment examining destination entry using the Ali-Scout navigation system, and completion of an on-road evaluation of the Ali-Scout. In addition to application of these results to product improvement, Paul is working with the U.S. delegation to developing ISO standards for advanced driver interfaces. He is the lead author of a report for the U.S. Department of Transportation describing the first set of U.S. design guidelines for those interfaces. To support this research, numerous improvements have been made to the Driver Interface Research Simulator (true network architecture, torque feedback, real-time traffic, computer-generated instrument cluster, etc.) and the instrumented car.

Monroe Keyserling was promoted to Full Professor in September and continues to serve as Director of The University of Michigan Center for Occupational Health and Safety Engineering. Keyserling is currently involved in two studies of ergonomic and safety issues in distribution operations. A two-year study sponsored by PepsiCo Food Services is focused
Faculty Focus

on reducing injuries in trucking delivery operations and food service warehousing. A three-year study, sponsored by Chrysler and the United Auto Workers, was recently initiated to develop innovative approaches for controlling ergonomic stresses in Chrysler/Mopar parts depots. This project is a collaborative effort with researchers from Johns Hopkins University. Keyserling continues working with graduate student Kimberly Monroe on a study of physical capabilities of older workers. Some early results of this project were presented at a meeting in Stockholm, Sweden.

Jeffrey Liker continues to be active in the area of Japanese technology management (see articles on "IOE becomes lean" and "The Japan Technology Management Program"). His book Engineered in Japan (Oxford University Press, 1995) won a 1996 Shingo Prize for Excellence in Research Manufacturing. He is currently working on two edited books on lean manufacturing in the U.S. and one book called Designing across Organizations: Concurrent engineering through the supply chain (with Mitchell Fleischer). He is coediting a special issue of IEEE Transactions on Engineering Management on the topic of Technology Management and the Asia Pacific. He continues to work with Chelsea White on the Sloan trucking grant studying the impact of Just-In-Time manufacturing systems on trucking.

Yili Liu continues teaching and research in the area of cognitive ergonomics. The "Cognitive Ergonomics" course he taught in the past few years as an IOE 591 course has become a regularly scheduled course with a course number IOE 536. In his research, in addition to his theoretical work of developing computational models of cognitive performance, he is also working with his Ph.D. students in experimental studies of driver behavior. He is also continuing his work with his Ph.D. students in the area of intelligent transportation systems (ITS), with a focus on modeling and aiding highway traffic operators. In addition to publishing research articles in highly ranked refereed journals, he has completed a book chapter titled "Software-user interface design" for the Handbook of Human Factors and Ergonomics, which is scheduled to appear in 1997 as a Wiley publication. He is also coauthoring an introductory human factors textbook, which is now 80% complete and will be published by Addison-Wesley-Longman.

Katta Murty returned from his sabbatical leave at the Hong Kong University of Science and Technology (HKUST), where he has been advising on a project for developing decision support systems for operating container shipping terminals to achieve optimum performance. In August 1995 he was a keynote speaker at the International Conference OR95 held in Braga, Portugal. During his sabbatical year he also visited University of Campinas, Sao Paulo; Institute ITA (Technological Institute of the Air Force of Brazil); and UNISOMA consulting company in Campinas, Sao Paulo, Brazil; University of Siena, Italy; and The Chinese Academy of Sciences and Tsinghua University in Beijing, China. Besides presenting seminars in all these places, he advised the project team at UNISOMA working at CVRD (Iron Ore Exporting Division), Port of Tubarao, Vittoria, State of Espirito Santo, Brazil, on applying optimization techniques to reorganize the port operations for maximizing the amount of iron ore loaded into the vessels daily. While at HKUST he helped the administrators on both sides to reach an exchange agreement between HKUST and our College of Engineering. He continues to advise the US Army at White Sands Missile Range on an optimum plan for training the Army National Guard Forces scattered all over the country, on combat training simulators; and with his theoretical work on optimization algorithms.

Tava Olsen continues her research on the scheduling and analysis of manufacturing systems. She is an active participant in the college's Engineering Research Center for Reconfigurable Manufacturing Systems. She has also developed new research interests in telecommunications and is working with a faculty member in EECS. Professor Olsen continues to teach courses in simulation and stochastic processes. This winter semester she is teaching a new graduate course in stochastic processes. Her teaching methods were recently highlighted in the "Michigan Engineer" magazine.

Stephen Pollock has been working, along with his graduate students, on a variety of projects, including: detection of change in multi-state systems, stochastic modeling of urinary tract diseases, the optimal degree of anisogamy, performance characteristics of nonstandard
sequential testing procedures. He continues to teach introductory and advanced courses in Decision Analysis, as well as the mathematical modelling "studio" (jointly, in the Winter 1997 term, with Assistant Professor Chick). He and Professor Nair are continuing on a long-term assignment for a National Research Council Committee that is analyzing the use of statistical methods in weapon systems evaluation.

Robert Smith is continuing his research in infinite horizon optimization under an NSF Grant in this field. One of his students, Alfredo Garcia recently defended his Ph.D. thesis in the area of infinite games which provided a novel resolution of the Prisoners Dilemma. Smith is continuing as Director of the Dynamic Systems Optimizations Laboratory. One of the research thrusts in the Lab, funded by the UM Research Center of Excellence in Intelligent Transportation Systems, is the problem of dynamically routing vehicles within a congested traffic network so as to reduce the trip time experienced. He is also serving this year on the Senate Assembly Academic Advisory Committee to the Provost.

Chelsea C. White, III, is currently Director of the Intelligent Transport Systems Research Center and Co-Director of the Sloan supported Trucking Industry Program. His research is focused on applications of information technology on fleet management, in particular the development of route guidance algorithms based on real-time traffic congestion information. He is also working with Prof. Bean on algorithms for various classes of Markov decision processes.

Introducing . . . New and Visiting Faculty

Shane Henderson joined the University of Michigan as Assistant Professor in Industrial and Operations Engineering in September of this year. Professor Henderson received his B.Sc. (Hons) in Mathematics in 1991 from the University of Auckland, New Zealand. He then received both his M.S. (Statistics 1995) and his Ph.D. (Operations Research 1996) from Stanford University.

Professor Henderson currently teaches courses in Operations Management and project practice, and hopes to offer a course in advanced simulation theory next year. His research interests include queuing systems and applied probability, but center around simulation methodology. His current research focuses on efficiency improvement techniques in simulation (i.e., obtaining more information out of the same amount of computation). He is particularly interested in incorporating efficiency improvement techniques into commercial simulation packages, an area that has long been neglected.

In the long term, he hopes to develop a Simulation Research Center. Such a center would have two principal objectives. First, to expose students (both graduate and undergraduate) to real simulation projects, and second, to attempt to bridge the gap between current simulation practice, and simulation research.

Vadim Linetsky, Ph.D., is working with Professor Birge on starting a new interdisciplinary graduate program at the University of Michigan: Master of Science in Financial Engineering, and teaching a new class: "Seminar in Financial Engineering". Financial Engineering is a new discipline on the crossroads of business, finance and economics, and mathematics, statistics and computer science. It is an extremely exciting and fast-growing area of engineering. Research problems are very challenging technically and have immediate applicability in practice. Linetsky's research area is financial derivatives and risk management, and he is working on developing mathematical models to price and analyze derivative securities traded in international financial markets.

Alumni Updates and Special Recognitions

Alumni Updates

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

First Lieutenant Lisa Adams-McNeme (BSE '93, MSE '94) graduated from pilot training last April and is now flying the C-21 at Randolf AFB in Texas, transporting military and civilian leaders. She married Paul McNeme last May.

Clifford A. Dean (BSE '50, LLB) is now retired from his position as Senior Patent Attorney. Throughout his career, Clifford worked at both Sunbeam Corporation and Abbot Laboratories.

In September, Eric D. Keene (BSE, MBA - Case Western) joined the Chicago office of Russell Reynolds Associates, one of the world's leading executive recruiting firms. Prior to joining Russell Reynolds, Eric was an associate at McKinsey & Company in Cleveland, serving clients in the telecommunications, banking and automotive industries. He also previously worked as a account executive in the Network Services Division of AT&T in Chicago.

Special Recognitions

Ph.D. student Michael Gerard was awarded the Tichauer Award for Best Ergonomics Platform by a Young Researcher at AIHCE '96. Gerard's presentation was entitled Effects of Low, Medium and High Keyboard Stiffness on Typing Force, EMG, and Subjective Preference Among Transcriptionists.

Kimberly A. Monroe was awarded a Rackham Dissertation Thesis Grant for her research on time and comfort tolerance for maintaining prolonged work postures; Monroe's results will be used to develop job design guidelines that consider and accommodate the capabilities of older workers.

In February, Ph.D. student Matthew Reed received the Ralph H. Isbrandt Automotive Safety Award from the Society of Automotive Engineers (SAE). The annual award recognizes the author(s) of the most outstanding paper in automotive safety. The paper Laboratory Investigations and Mathematical Modeling of Airbag-Induced Skin Burns was coauthored by Lawrence Schneider and Richard Burney.

Second year Ph.D. student Barbara Rocci received the 1996 Sloan Summer Fellowship, which was awarded by the Graduate Experience Project. In addition, Rocci was awarded the 1996/97 Distinguished Research Partnership Award for her research with Professor Steve Pollock.

Ph.D. candidate Durward Sobek II, received the Best Paper Award at the 1996 ASME Design Theory and Methodology Conference this past summer. Durward's paper was entitled Principles of Toyota's Set-Based Concurrent Engineering Process.


The IOE Department was highly recognized by Rackham this year when it awarded three of our Ph.D. students with Predoctoral Fellowships. John J. Neale, Wendi Latko, and Daniel J. Reaume were three of only 60 awardees recognized in the entire University.
Student Organization

The University of Michigan chapter of Alpha Pi Mu (APM), the national industrial engineering honor society, began the 1996-97 academic year by brainstorming ideas and defining our purpose in a new mission statement:

The University of Michigan Chapter of Alpha Pi Mu exists not only to honor student achievers, but to provide them with professional, social, service, and leadership opportunities for further achievement. As student advocates, we seek to work with the department and other student societies to build a sense of community for all students in the Industrial Engineering department and the College.

APM has been very active in fulfilling that mission this fall, and looks forward to continued enthusiasm in '97. In October and November alone, the APM career planning committee sponsored corporate speakers from Intel Corp., Capital One Financial, and Deloitte & Touche LLP. We also published a resume book and organized Senior Advice Night, a forum for undergraduates to ask for informal advice on classes and instructors. Our social activities included happy hours with other engineering societies, the IOE barbecue, rock'n bowl night, and a victorious battle of "capture the flag" vs. Tau Beta Pi in the Arboretum. Dedicated APM initiates devoted one Friday afternoon to helping the Safehouse domestic violence shelter with their annual mailout.

In what we see as a model for building continued relationships with employers and other groups on campus, APM organized a community service project with Andersen Consulting and Ronald McDonald House on November 10. APM members worked in small teams with employees from Andersen cleaning up around Ronald McDonald House, while one team prepared an original Southwestern dinner for the House residents. After the cleaning was finished, the students, Andersen employees, and residents shared a meal together. This project gave students a chance to learn more about potential careers and develop contacts while also performing community service.

In accordance with our mission statement, we have worked closely with IOE to open up most of our activities to all IOE students who want to get involved. APM has also designed and printed IOE Department T-shirts for sale to students, faculty, and alumni as a fund-raiser for APM and IOE. We look forward to continued involvement and even greater presence next semester. For more information about participating in an APM corporate/professional presentation, social activity, or community service project, please contact me at (313)-996-0989.

-Bryan David Griffith
President, Alpha Pi Mu

Special Honors

Outstanding Teaching
Steven F. Rasch

Graduate Student Instructor of the Year
Darya Lin

Wyeth Allen Award
Bryan Griffith

Outstanding Undergraduate Student
Tammy Rice

Outstanding Graduate Student
John Neale

Anderson Consulting Scholarship
Erin Martino

Goldberg/Anderson Scholarship
Sean Burke

Charitable Contributions

We thank you for your support during our building renovation and expansion. Your financial pledges have made the project an evolving reality. However, we are still in need of financial support to continue the endeavor. And, as always we have other needs such as student fellowship and scholarship support and equipment to allow students and faculty to make the most from their studies and research.

Remember that you may take full-market value deductibility for appreciated assets, and that many corporations offer matching funds. The back cover has been provided for your convenience in making a donation. We appreciate your continued support!
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 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)

Please return this form to:  
John R. Birge, Chair  
Industrial and Operations Engineering  
University of Michigan  
1205 Beal  
Ann Arbor, MI 48109-2117

Name ____________________________________________________________  
Address __________________________________________________________

IOE Graduation Year/Degree Received ____________________________________

Other Degrees Received ________________________________________________

Place Of Employment ___________________________  
Job Title ___________________________________________  
Responsibilities ______________________________________________________

News You'd Like To Share In The Next Newsletter __________________________

Check below if you would like information on the following:  
[ ] Speaking about your profession at an IIE/APM/VIBES luncheon  
[ ] Sponsoring a senior project team  
[ ] Joining the alumni academy  
[ ] 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")

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