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# IMSE

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Vol. 3, No. 1

Iowa State University, Ames, Iowa

January 1992

## WHY IS RESEARCH IMPORTANT?

**By Way Kuo, Professor and Chair, IMSE Department**

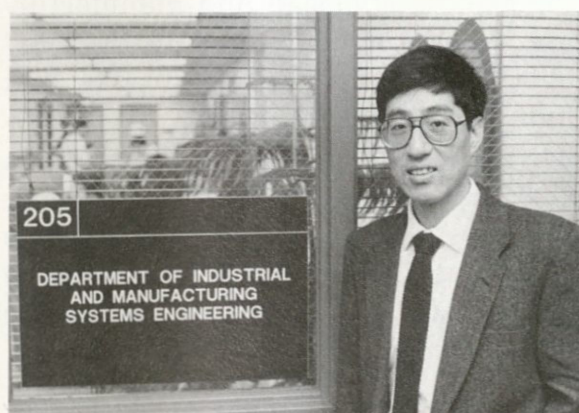
Many of us often wonder about the necessity for IMSE professors to perform research. Some say that research could actually hurt teaching. However, there are many valid reasons why professors should include research activities as part of their job. Here let me focus on the benefits of research to students.

Of the last four IMSE newsletters, the Vol. 2, No. 2, August '91 issue has by far received the most overwhelming response from readers, including alumni, corporate managers, and students currently enrolled. Let me quote from a small sample of these unsolicited responses:

*"Congratulations on your progress in establishing IMSE Laboratories.... The practical nature of the labs will add an important dimension to the educational capabilities of the ISU College of Engineering,"* says a letter from **John S. Gault**, director of production engineering, Deere & Company.

*"I wish I could stay one more year to use the new laboratories,"* writes **Susan Gehring**, a graduating IMSE senior who has had co-op experience at Anheuser-Busch.

*"I am proud of being a member of the historical lab development team,"* says **Bon-Wan Choi**, a Korean graduate student working with one graduate and two



undergraduate students in developing the Materials Handling Lab.

*"Enclosed is a check for Dr. Kuo, Dr. Jackman, and Dr. Vardeman's lab for SPC techniques."* That is all **Elizabeth Suerth** said in a short note sent to me.

*"It is exciting to see the laboratory development ... we will provide more scholarships to IMSE students,"* writes **Jeffery Robbins**, who visits us often to recruit for Alcoa and is one of the many strong supporters of the IMSE curriculum.

Many thanks for these encouraging responses.

Granted that laboratory development is perceived as an essential mission by the faculty, where does the money come from? The state of Iowa budgets very little money for lab development. Student fees contribute almost nothing, and it is very unusual that a donor would even consider providing money for a

piece of equipment. Nevertheless, we cannot lose sight of the fact that performing research and incorporating research results into the undergraduate curriculum are the most promising ways open to us to achieve quality engineering education.

In the last eight months, the IMSE Department has received unprecedented research contracts and grants totalling about \$3 million, twice the department's annual state budget. Part of this money has contributed to the development of the new laboratories. A breakdown of resources used for the development follows:

### Resources

#### Percent of total development

Unsolicited research grants/contracts	55%
Solicited research grants/contracts	20%
Alumni and corporate support (with detailed proposals submitted and reviewed)	15%
ISU/Engineering College (matching funds and special requests)	10%

This table shows that research is the most significant factor in new laboratory development. I also note that our laboratory developers are among our very best researchers. It is they who guarantee that our students receive first-hand knowledge gleaned from working experiences in state-of-the-art laboratories.

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page 2*

## THANK YOU FOR YOUR SUPPORT

The IMSE Department recognizes the following alumni and friends for their gifts to the department during 1991. Contributors supported IMSE's new focus on manufacturing, responded to items they read in *IMSE News*, or gave as part of ISU's Partnership for Prominence capital campaign.

### 1991 Donors

Timothy ('89) and Karen ('89) Ancona  
William ('69) and Diane Armstrong  
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Michael Bahl, '84  
Wayne Barkman, '47  
Pamela Barrett, '85  
Homer ('35) and Margaret Batman  
Bradford Beeler, '48

Roderick Benjamin, '69  
Sandra Berry, '83  
Stephen Berry, '70  
Mark Biegger, '84  
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Sarah Blumenschein, '84  
Elmer Boedy, '49  
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Michael Cambron, '82  
Donald Campbell, '63  
Everett Casey, '46  
Julie Chichlowski, '83  
Richard Clayton, '66  
Richard Colgan, '69  
Lisa Cotter, '83

Eugene Dankbar, '83  
Chester ('50) and Marie Diercks  
Floyd ('49) and Erma Dirks  
Cindy Donovan, '77  
Paul Drda, '84  
David Drew, '62  
Jack Eckhardt, '48  
Raymond Edlund, '60  
Traci Egly, '87  
Marlin Eiben, '79  
Todd ('86) and Kelly Elliott  
Terence ('61) and Mary ('61) Esbeck  
Noel Erickson, '81  
Lisa Ewan, '83  
Robert ('52) and Alice Faust  
Thomas Ferrini, '86  
Richard Fickery, '63  
Ardis Fincham  
Mary Franco  
Charles French, '65

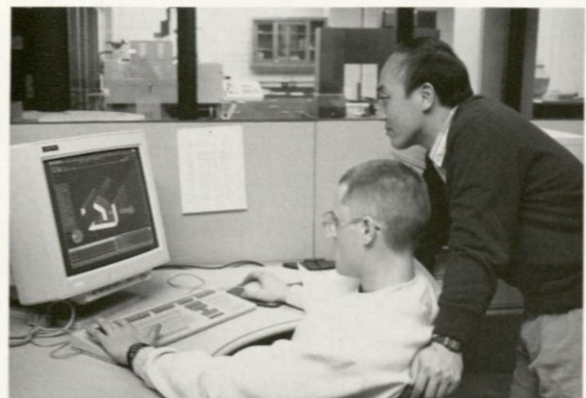
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## CARVER LABORATORY SITE OPENS

Defining and developing concurrent engineering techniques and combining them with computer-based engineering methods is the task IMSE Department investigators have set for themselves as their contribution to research efforts in the **Iowa Center for Emerging Manufacturing Technology**.

**John K. Jackman**, assistant IMSE professor, directs the center's research on concurrent engineering. Other IMSE participants include professor and chairman **Way Kuo** and assistant professors **Douglas D. Gemmill**, **Richard J. Linn**, and **Amy J. C. Trappey**.



The Iowa Center for Emerging Manufacturing Technology was initiated in July 1990 with a grant from the Carver Foundation of Muscatine, Iowa. Initial funding included \$2.5 million from the Roy J. Carver Charitable Trust and \$1.3 million from ISU over a three-year period. The center is directed by mechanical engineering professor **James E. Bernard**.

Initial site preparation for the research laboratory, located in the Black Engineering Building, was completed in June

1991. The Carver Laboratory includes a 2,100-square-foot raised floor area of offices and engineering workstations adjacent to a 400-square-foot area housing manufacturing equipment.

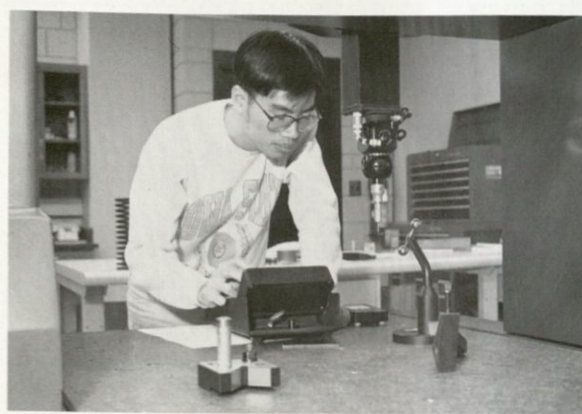
The lab houses a network of Digital Equipment Corporation engineering workstations dedicated to calculations underpinning design and manufacturing. These computers include two DEC 5000 PXGTs, two DEC 5000 PXs, and four DEC 3100 machines. The CAD-driven manufacturing area includes a CNC mill and lathe, Mitsubishi assembly robots, and a Brown and Sharpe coordinate measuring machine. The design and manufacturing areas are separated by a glass wall.

This laboratory will not only allow IMSE faculty and graduate students to perform their research in concurrent engineering but will also attract manufacturers to ISU to participate in research and educational programs.

Presently seven IMSE graduate students are funded by the center and performing research in the Carver Laboratory. M.S. student **Mark Pelzer** is working with John Jackman to investigate the role of functionality in determining the form features of a product design, with a view to generating conceptual designs. Jackman and Ph.D. student **Tai-hung Yang** are studying the role of reliability in concurrent engineering.

**Hung Tu**, an M.S. student, and Richard Linn are developing a method for determining the optimal assembly sequence

based on product geometry. Way Kuo and Ph.D. student **Bong Choi** are investigating new techniques for manu-



facturing systems control. Doug Gemmill is working with M.S. student **Jeff Wang** on stochastic optimization algorithms to be implemented and applied to the design of manufacturing systems.

**Mei-Chu Cheng**, an M.S. student, is performing research on the determination of machining strategy for compound NURBS surfaces with Amy Trappey. Ph.D. student **Parag Gupta** is also working with Trappey on a study of the influence of machining processes, machining forces, and part shapes on fixture configuration.



## RESEARCH (continued from front page)

The cost of developing laboratories goes far beyond the actual purchase of a piece of equipment. As you might guess, there is hardware setup, software development, equipment calibration, operation and safety testing, and more. Your continuing support for this development is much needed and appreciated.

An academic department has to be just as competitive in the academic community as you are in the business community. Research results will provide our students, the next generation engineering work force, with cutting-edge training through laboratory experience. This becomes even more expedient in the wake of shrinking high school enrollments and state budget cutbacks. We thank you for your care and concern, and we hope that our initial effort in laboratory development will substantiate our case for receiving your contributions.

## NEW IMSE RESEARCH PROJECTS

**Reliability of new chips burn-in.** In this special project solicited by IBM Headquarters, professor and chair **Way Kuo** is considering incompatibility factors in studying the reliability and cost trade-offs of new systems using modern integrated circuits. Kuo's previously developed theoretical burn-in models were solicited by IBM as the basis for this investigation.

**Economic determination of specification levels and delivery priorities for semiconductor products.** Assistant professor **K. Jo Min** received a National Science Foundation Research Initiation Grant from the Program of Operations Research and Production Systems in the Division of Design and Manufacturing for this study. He will construct and analyze a new, economically efficient allocation mechanism for semiconductor products by simultaneously determining specification levels and delivery priorities. Min will also analyze the

impacts on profitability of downgrading, complementarity, and substitutability of semiconductor products, processes frequently observed in the semiconductor industry but not well understood analytically.

**Development of methodologies for the design of focused factories.** Assistant professor **Douglas D. Gemmill** spent last summer at the John Deere facility in Ottumwa, Iowa, as part of a one-year research grant from John Deere Ottumwa Works. Through June 1992, Gemmill and a graduate student will be researching methodologies for the implementation of focused factories at existing facilities, including the implementation of group technology cells. The research will include the development of algorithms and the investigation of the use of interactive graphics software for the design of focused factories and cellular manufacturing.

## CALL FOR ALUMNI AWARDS

The College of Engineering and the Alumni Association of Iowa State University present annual awards to ISU alumni. We in the department may be unaware of alumni who are deserving of these awards. We are asking for your recommendation of names of individuals who would qualify for the following awards.

**Distinguished Achievement Citation.** This award honors a nationally or internationally known alumnus who is recognized for outstanding achievement and human betterment in fields such as, but not limited to, education, government, social welfare, humanities, sciences, agriculture, finance, arts, professions, business, and the home.

**Alumni Merit Award.** This award recognizes any graduate or former student who has made an outstanding contribution to human welfare that transcends purely professional accomplishments and brings honor to the university.

**Alumni Recognition Medal.** The medal is given in recognition of long, loyal, and outstanding service to Iowa State University through alumni activities.

**Outstanding Young Alumnus.** This award is for any graduate or former student under 39 years of age (not having reached the 39th birthday before December 31 of the year in which the award is made), whose endeavors in professional, civic, business, performing arts, home-related, political, or similar activities are worthy of recognition and have brought honor to the university.

**Professional Achievement Citation in Engineering.** This award recognizes superior technical or professional accomplishments in the areas of research, development, administration, education, and other engineering activities. The citation was established to recognize alumni whose chief claim to fame is professional competence and creativity.

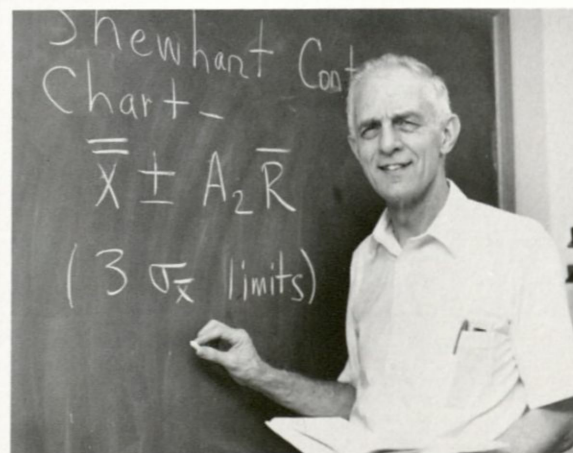
**Professional Progress in Engineering Award.** This honor recognizes outstanding professional progress and personal development in a field of engineering specialization as evidenced by significant contributions to the theory and practice of engineering, distinguished service rendered to the profession, appropriate community service, and/or achievement in a leadership position. There shall also be evidence of recognition through citations and acceptance of achievements by colleagues and of the promise of continued progress and development.

**Marston Medal.** Awarded to an engineering alumnus of at least 30 years standing, the Marston Medal recognizes outstanding achievements in engineering, superior ability, and professional prominence in the nominee's chosen field.

If you know of an alumnus who deserves one of these awards, please send us his or her name and address, the name of the appropriate award, and we will do the rest. Send this information to Chair, Honors and Awards Committee, IMSE Department, 205 Engineering Annex, ISU, Ames, Iowa 50011-2070.

## BERGER IS HANDBOOK EDITOR

The *Quality Engineer Handbook* was published in November 1991. IMSE professor **Roger W. Berger** was editor of the book and author of the chapter on quality planning. Berger is chair of the Quality Management Division of the American Society of Quality Control.



## Please stay in touch!

We want to hear about your career moves and personal news for our alumni news page. We need your help, too, with donations to scholarship funds, lab facilities, and student groups. If you're making a contribu-

tion to your alma mater, please consider designating it for the Department of Industrial and Manufacturing Systems Engineering. The form below will make it easy for you.

Name \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

I want to tell you about: \_\_\_\_\_

I want to help the department with a contribution to:

- ☐ New laboratories development fund  
☐ Scholarships  
☐ General department use  
☐ Other: \_\_\_\_\_

## DEPARTMENT ENCOURAGES CO-OP EXPERIENCE

The IMSE Co-op Program includes approximately 40 sophomore, junior, and senior students this academic year. The students spend a total of 12 to 16 months in three separate terms with employers. Presently, students are located at several manufacturing companies and in service industries such as medical centers.

The Co-op Program is an excellent opportunity for students to mix practical experience with classroom and laboratory experience. The IMSE Department is encouraging its students to apply for the Co-op Program and interview with companies if they have a 2.75 or better grade point average.

Alumni who are interested in starting a co-op program at their workplace can contact associate IMSE professor **Howard D. Meeks** at 515/294-2131 for more information.



## SCHOLARSHIP RECIPIENTS

**ALCOA Scholarships for 1991-92**  
 Lisa Harrington \$1,000  
 Victoria Patterson \$1,000  
 Angela Woolery \$1,000

## IMSE'S EQUIPMENT/ SOFTWARE\* NEEDS

IBM-compatible PC  
 CNC milling centers (2)  
 CNC turning centers (2)  
 Assembly robots (2)  
 Coordinate measuring machine  
 Rapid prototyping system  
 SGI 1.2GB hard drive plus memory upgrade  
 Programmable logic controllers (6)  
 Automatically Programmed Tool\*  
 SmartCAM\*



## A · L · U · M · S

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1981

**Mary Beth (Hart) Brown**, engineering development manager, Hallmark Cards, Inc., Kansas City, MO.

1985

**Rodger Sill**, E.Op., manager, model kit development, Ertl Co., Dyersville, IA.

**Elizabeth Suerth**, IE, attending graduate school at University of Missouri for an M.S. in management engineering.

1989

**Linda (Geier) Schmidt**, IE, M.S.'90, attending graduate school at Carnegie-Mellon for a Ph.D.

1990

**Michael C. Schmidt**, IE, Quality Assurance Engineer, Tri-Tech Services, Inc., Pittsburgh, Pennsylvania

## THANK YOU FOR YOUR SUPPORT (continued from front page)

Dean Galvin, '49  
Ann Getting, '89  
Carol Gibbs, '84  
James Goodall, '50  
Daniel Goodhope, '81  
James Grant, '85  
Donald Grau, '38  
Stanley Gray, '75  
Kenneth Hagan, '34  
Bruce Hallahan, '84  
David Hanson, '52  
James ('59) and Judith Hanson  
Mary Hart, '81  
Thomas Hart, '84  
Mary Hassler, '85  
Jay Heisterkamp, '85  
Julia Henderson  
Donald Hendricks, '63  
Stacie ('89) and Trace ('89) Hennesy  
Jeffrey Hermanson, '90  
Mr. and Mrs. Rudolf Herrmann, '73  
James Hoag, '50  
Harry Hoover, '67  
Jeffrey Hutchinson, '85  
Raymond Hutchison, '70  
Douglas Hyde, '87  
Kevin Jach, '85  
Ned Jackson, '61  
Mark Jensen, '79  
Donald Johnson, '57  
Timothy Jury, '80  
Alan Kamphius, '59  
Patrick Keily, '77  
Howard Kellogg, '48  
Lois King, '81  
Mark ('76) and Kristin Kooiker  
Mikel Koschmeder, '81  
Thomas Krob, '72  
Melissa Kruse, '80

Way Kuo  
Albert Landberg, '59  
Andre Lanthier, '86  
Chao Lee  
David Lemme, '78  
Mr. and Mrs. Mark Lockard, '82  
Dwight Long, '84  
Eric ('86) and Lucienne Lovig  
Robin Lowman, '86  
Mary Mahoney, '83  
Helena Mamaril, '87  
Wayne Marotz, '69  
Richard McLain, '66  
Helen McKean, '52  
Kent McNeley, '79  
Thomas Mefferd, '65  
Mary Meline, '88  
Mr. and Mrs. Loran Mohr, '66  
Robert Mohr, '81  
Anne Murray, '80  
Christopher Nail, '78  
Burnell Nelson, '68  
Mark Nobbe, '85  
William O'Toole, '84  
James ('67) and Jane Palmer  
Robert Paulson, '63  
John Perdue, '73  
Bradley Pitzer, '84  
Douglas ('83) and Judy Pletcher  
Scott Pollpeter, '83  
Michael Polich, '85  
Carl Rausch, '67  
Patricia Rogers, '88  
Thomas Roth, '80  
Charles Roy, '35  
David Rush, '85  
Charles Safris, '63  
Karla Sandry, '83  
Paul ('74) and Judy Schlick

Arthur Schwartz, '58  
John Schulz, '84  
John R. Selby, '56  
Marc Sequeira, '83  
Michael Sheldon, '81  
Fred Sheppard, '64  
Lori Shimp, '82  
David ('84) and Jeanene Skarshaug  
Mr. and Mrs. Jerome Skeers, '67  
Lucy Smith, '87  
Melvin Snyder, '37  
Darwin ('37) and Ruth ('38) Soder  
Jeffrey Sprau, '87  
Joseph Stark, '89  
William Stark, '81  
Arlan Stavnheim, '61  
Judson Stepp, '86  
Paul ('51) and Judith Strohm  
Elizabeth Suerth, '85  
James Swanson, '59  
Charles Thomas, '61  
Alexander Thompson, '43  
Teresa Thornton, '86  
Glen Tott, '69  
James ('74) and Karen ('75) Uschkrat  
Dennis Van Liew, '80  
Madan ('89) and Sautri Venkateshaiah  
Douglas ('87) and Jennifer ('87) Vogel  
Robert ('57) and Mary Wagner  
Scott Wahl, '82  
Joseph Walkup  
Lynne Wannarka, '89  
Sandra Wege, '84  
Curtis Westadt, '81  
Garnett Whitehurst, '80  
Richard Whiteside, '55  
Robert ('36) and Maxine ('37) Williams  
Bruce Wyborny, '61

## IMSE

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Address comments, questions, and news items to:  
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