New Building Named For Professor Henry M. Black

By the time this newsletter reaches your doorstep, the new mechanical engineering and mechanics building will have a new name:

The Henry M. Black Engineering Building

Dr. Gordon Eaton, president of Iowa State University, speaking about the decision to name the facility for Black said, “Henry Black is best known for his ability to motivate people to help them reach and achieve their fullest potentials. Throughout his career, he instilled in his students and in his faculty an enthusiasm for, and an excitement about, learning that touched all those with whom he came into contact. Naming the newest engineering building for Black is splendid recognition for a man who did much to strengthen the College of Engineering at Iowa State University.”

Many of you who were at Iowa State during Henry Black’s tenure as head of the department will no doubt remember him as a man who knew how to teach people about living as well as how to give them the skills and discipline necessary for successful careers in engineering. He was a teacher who had an extraordinary ability to nurture the initiative of inquisitive minds.

Henry Black, Class of 1929, was head of the department from 1946 to 1972. Through his efforts and ability to attract outstanding academicians and students to Iowa State University, the department gained national and international recognition.

A registered professional engineer, Black is a fellow and past vice president of the American Society of Mechanical Engineers, a member of the American Society for Engineering Education, a member and past president of the Iowa Engineering Society, a member of the Iowa State Board of Engineering Examiners and Tau Beta Pi.

Black retired from the U.S. Corps of Engineers in 1963 after 30 years of continuous service. In World War II, he served as a colonel in the 7th Army Corps. He graduated from the Army-Navy Staff College in 1945. Among his many military honors are the European, African and Middle East Theatre Campaign Medal with five battle stars and combat landing arrowhead, the Legion of Merit Medal, and the French Croix de Guerre.

In the community, Black is active in Rotary, the Boy Scouts of America, the Ames Chamber of Commerce, the Ames Economic Development Commission and the Y.M.C.A. He is a member of the United Church of Christ where he has served as moderator, deacon and trustee.

At Iowa State, he has served on the Academic Standards Committee and the Technical Institutes Committee and is currently a member of the College of Engineering’s Committee on Honors and Awards. He is president of his alumni class and is a founder of the Senior Advisory Group of Engineers made up of retired faculty from the College of Engineering. Black served for many years as chapter advisor to his fraternity, Delta Sigma Phi. He has been instrumental in raising more than $450,000 for the Black-Hilstrom Fund and worked with the Iowa State Legislature to lay the ground work which made possible the $14 million building which now bears his name.

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Major Endowment Created For The Department

Raymond A. Engel, Honored

On February 20, at the dedication of the Henry M. Black Engineering Building, another man received a significant honor. Raymond A. Engel, who was a benefactor of the department, was recognized through the naming of a new laboratory facility: The Raymond A. Engel Laboratory in Mechanical Engineering.

Raymond Engel, who died on August 18, 1986, grew up in Reinbeck, Iowa where he and Henry Black were boyhood friends. Like Black, he graduated with a B.S. in mechanical engineering from Iowa State in 1929 and, like Black, he belonged to the Delta Sigma Phi fraternity. The lifelong friendship between Engel and Black serves as a powerful example of men who chose different career paths, but who, through camaraderie and mutual respect, were able to enhance their own lives and their respective realms, as well.

Says Jim Bernard, chairman of the department, “The Raymond A. Engel Laboratory in Mechanical Engineering is a lasting memorial to a man who knew that the applied research he was doing in industry was greatly strengthened because he could interact with researchers at Iowa State and could also hire young . . .

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Raymond A. and Kathryn A. Engel
Mechanical Engineering Faculty Report

Two Faculty Members Named ASME Fellows
The most prestigious rank in the American Society of Mechanical Engineers is the Fellow Grade, which is reserved for members who have made truly exceptional contributions to the engineering profession. The department is pleased to announce that two of our faculty recently received this honor. They are Charles Mischke and Richard Pletcher.

Through this honor, Mischke and Pletcher bring new status to the department. It is a pleasure to report on the fine work being done by these outstanding faculty members.

Charles Mischke

Professor Charles Mischke may be best described as "insightful." Perhaps this quality comes from his hobby of collecting "gems" of truth and wit on human nature and the human condition. He shares his "gems" with his students by writing one on the board before each lecture. Offering something different seems to work as an attention-getter, and Mischke believes in using an occasional "hook" to reinforce what he is teaching. Recently, Mischke offered some of his insights on higher education.

"A university is necessarily a false environment. Due to a need for efficiency, universities become large, and highly structured schedules become necessary." The problem, according to Mischke, arises because students' intellectual and creative rhythms cannot be perfectly matched to the imposed schedule. Given the large number of students enrolled in a university, the current system seems to be the only way to operate. Mischke recommends the use of some independent studies to help alleviate the problem. Another way he feels a college differs from the working world is teachers' willingness to accept poor ideas, solutions, and presentations from their students, while employers are not so tolerant. "Students who take their education too seriously risk falling for the falseness of the university and thinking it accurately represents the real world."

Turning to engineering, in particular, Mischke feels that the two most important characteristics for engineering students are an understanding of the environment and its physical embodiments, and creativity. "Nature is the tester of an engineer's products. If something is designed with the wrong margin of safety, nature will prove it inadequate." Regarding creativity, Mischke says, "in this day and age an engineer can often rely on somebody else's solution. But we hope to teach people to create their own solution: a better solution."

A year-long sabbatical in 1985 allowed Mischke to work on preparations for a recently published book and also to write four papers on the use of stochastic (probabilistic) models in engineering design. Deterministic models often used in engineering problems do not accurately fit real-life conditions because they do not take distributions of results over several trials into account. Mischke's recent applications of stochastic models are indicated by the titles of the papers he presented at the Winter Annual Meeting of The American Society of Mechanical Engineers: Prediction of Stochastic Endurance Strength, Probabilistic Views of the Palmgren-Miner Damage Rule, A New Approach for the Identification of a Regression Locus for Estimating CDF-Failure Equations on Rectified Plots, and Some Guidance on Relating Factor of Safety to Risk of Failure.

The new book, which Mischke considers his best effort to date, is Standard Handbook of Machine Design, which he coedited with Joseph E. Shigley of the University of Michigan. "This comprehensive 1632 page resource book covers all aspects of machine design," says Mischke, "and contains 1,222,689 well chosen words of text, counted by computer and unchecked by humans." Mischke wrote the chapters on Computational Considerations in Design, The Strength of Cold-Worked and Heat-Treated Steels, Strength under Dynamic Conditions, and Rolling Contact Bearings, and contributed material to several other chapters.

He is presently working as coauthor with Joseph Shigley on the fifth edition of Mechanical Engineering Design.
Richard Pletcher

Richard Pletcher, along with his graduate students, has been one of mechanical engineering's more prolific members in recent years. In 1986 alone, he presented papers at the AIAA/ASME 4th Fluid Mechanics, Plasma Dynamics and Lasers Conference in Atlanta, the AIAA/ASME Thermophysics and Heat Transfer Conference in Boston, and the Eighth International Heat Transfer Conference in San Francisco.

Pletcher defines his research as the study of computational mechanics and heat transfer. He develops computer simulations of processes and phenomena such as air current flow patterns around aircraft, airfoils, space vehicles, and turbo machines. He explains the advantage of using a computer by saying, "To get information that we need to build such aircraft, we need to run experiments. But these experiments can be inaccurate and expensive. Another alternative is to try to solve the governing equations involved in a given situation by computer. With these solutions, we can develop "motion pictures" of what the flow looks like."

Two specific phenomena investigated by Pletcher are air flow separation and jets in cross flow. Flow separation occurs when an aircraft pulls up or changes direction sharply. This causes a region of recirculation to form around the wing, resulting in a loss of lift. Jets in cross flow occur when air "plumes" such as those from power plants' cooling towers, flow into the atmosphere, dispersing effluents. The atmospheric winds change the direction of the plume's flow and the concentration of effluents. This same phenomenon occurs in the cooling of such devices as turbine blades in jet engines.

The most recent problem addressed by Pletcher is the flow and sudden expansion behind a rearward-facing step where circulation regions exist. These conditions occur in such places as combustion chambers and heat exchangers. Most of the financial support for Pletcher's work is currently from the National Science Foundation and NASA. Pletcher also recently received a grant from the Allison Gas Turbine Division of General Motors.

In addition to his published research papers, Pletcher has written a textbook on computational fluid mechanics and heat transfer with two ISU aerospace engineering instructors. The text was published in 1984 and is being used in the department.

Asked what he enjoys most about Iowa and the university, Pletcher replied, "The opportunity and sound program at Iowa State, the straightforward people, my own microcomputer in my office, and Iowa's pheasant hunting." He also enjoys his students, saying, "I've been very pleased for a number of years with the type of student we get. Generally, they seem to have a desire to learn, they're sincere, hard-working, and honest. It would be hard to find a better group of young people."

New To The Department

Mohan S. Devgun has only been at Iowa State since last August, but he has already set a challenging goal for himself: to help establish a program in computer-integrated manufacturing that will enhance the already fine reputation of the department.

He says, "The challenge which Iowa State offered to me was to establish new courses, new programs, new labs, and initiate interaction with manufacturers within and beyond Iowa." Calling computer-integrated manufacturing the "hot" area in both engineering schools and industry, Devgun explains the economic importance of collaboration between those two factions. "I would like to develop research which is applied and coordinated with the work of industrial people so that we can develop a direct link with Iowa industry and try to meet their needs. Through our research, we want to develop methods to improve their manufacturing systems."

Before coming to ISU, Devgun was at the University of Birmingham in England, where he helped develop a computer-integrated manufacturing center financed by industry. He found that research universities and industries in Europe enjoy mutually supportive relationships rarely found in the U.S. He now wants to develop similar ties between industry and Iowa State, working first with Iowa companies, then expanding into the Midwest and beyond. In his opinion, manufacturing has often been ignored in American universities, and he sees far-reaching implications. "To compete with Japan and other overseas producers, we must improve our manufacturing processes and products."

In October, Devgun presented a proposal to Iowa industrial representatives, who reacted very favorably. He has begun developing contacts with Iowa industrialists for future financial support and collaboration.

As far as immediate research on campus, Devgun intends to work extensively with the department's new General Electric welding robot. He hopes to incorporate a vision.

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Mechanical Engineering Faculty Report
Mohan S. Devgun . . .
Continued from page 3
system to track the welding and an optic system to control the process. The new robot will produce very dependable and consistent welds and can handle complicated materials shapes.
Finding ISU students "very keen and anxious to gain new and practical knowledge," Devgun points out that a recent poll of manufacturing companies found that students with knowledge of computer-integrated manufacturing processes had the best education for engineers whom they hired. This demand by employers provides impetus to develop graduate studies in computer-integrated manufacturing and, in Devgun's view, gives reason for optimism about the prospects for joint efforts between industry and Iowa State.

Mechanical Engineering Student Report

Paul Warner

What do you do if you've just graduated with a degree in mechanical engineering and find out that the only way to be the "idea person," the one who designs what others then build, is to have an advanced degree? If you're determined and talented enough, you go straight to graduate school, which is what Paul Warner is doing this spring.
Paul graduated from Iowa State in December and will continue his studies there, working with Professor Marty Vanderplas and serving as his research assistant. Warner's research will probably be in the area of vehicle dynamics, utilizing computer-aided design (CAD) and graphics. He believes that "the move in industry is to computerize all possible aspects of production" and appreciates the speed with which the computer can handle the necessary calculations.
While in high school, Warner realized that he was most interested in science and math and his counselor recommended Iowa State. He chose mechanical engineering over other engineering disciplines because he enjoys working with practical problems. "I can't see electrons flowing through a wire or two molecules bonding together and I don't think I would be happy working with something that abstract. Putting a bicycle together — that's my idea of a fun afternoon!"

Asked why he chose Iowa State over other schools for his Master's degree, Paul said, "I think the faculty has a lot to offer. Dr. Vanderplas is very experienced with vehicle dynamics and CAD. Also, the new building has really gotten me excited about engineering. It shows that mechanical engineering is important on campus. Our computer system now is so much more advanced — the new terminals have graphic capabilities and we're investing a lot in software for computer-aided design."

Warner hasn't decided whether he wants to work in industry or at a university, but he likes the freedom of choice in research projects that an academic career offers. Whichever he chooses, Warner appears likely to succeed in the "ideas" realm of engineering.

Judy Vance

Judy Vance, a freshman engineering instructor who is also working on her Master's degree in mechanical engineering, began her career in industry. After a few years, she realized that chances of reaching her career goals there were slim, due in part to the declining agricultural economy, and decided to return to her alma mater for an advanced degree. Now she's very involved in teaching and preparing students for life after college.
"What's exciting at the university is the opportunity to develop courses and programs. We're always trying to figure out what students will need to know when they graduate and the best way to give them that knowledge." Now in her third year of teaching at ISU, Vance says, "The students get me excited. It's fun to show them how to solve problems because there's a real skill involved that they don't learn in high school. We show them how to break down complex problems and solve them step-by-step. It's a good feeling when you find a solution."
Vance finished her Master's courses this fall and hopes to complete her thesis this summer. Then, she will probably go on for her Ph. D. Her research involves vibrations and dynamics, dealing mainly with sensitivity methods in determining mode shapes (patterns created by vibrating objects) and natural frequencies. These methods utilize sophisticated algorithms which reduce the number of computer calculations necessary to determine the natural frequencies of a system. An application of this research is in vehicle studies where the designer needs to determine natural frequencies in a car or truck that might jar the passengers or cause other problems. Vance will be using a state-of-the-art IRIS computer system which computes and graphically animates mode shapes.

Vance is motivated to become a teacher for a special reason: the recent decline in the number of women in engineering colleges and jobs. "It's very important for women to become engineering teachers so that women going through college can say, 'There's another woman who's done this — I can do it, too.' Girls don't hear about engineering early enough, in junior high and high school, when they need to be taking the math courses that will prepare them. Mechanical engineering, in particular, doesn't generally appeal to women. When you say those words, you think of someone rebuilding the engine of a car and not many women want to do that. But, they don't have to. If you like the way machines work, if you like seeing a machine do a job, and if you like math, chances are that you've got what it takes to be a mechanical engineer."


Dan Schertz is a full-time mechanical engineering undergraduate who works 15-20 hours per week as a computer programmer, volunteers as a tutor and serves as a student member of the department's curriculum committee. All this leads him to say, "Being a student is a lot of work, but I kind of enjoy that. I enjoy the challenge."

Dan, a senior from White Bear Lake, Minnesota, came to Iowa State because of its well respected engineering program and because he wanted to carry on a family tradition. Both his father, Cletus Schertz '59, and his brother, Patrick '81, attended ISU.

Although he hopes to attend graduate school sometime, Dan thinks he'd like to get a job when he graduates this spring. He would like to work in the automobile or aerospace industries and already has experience in automotives. As a co-op student, Dan has worked in the product engineering area, hydra-matic division of General Motors in Ypsilante; Michigan.

Programming computers for the department under the direction of Professor George Junkhan provides work opportunity for Dan and also gives another dimension to his educational experiences. He is involved in the Tau Beta Pi tutorial program and says he finds tutoring other students particularly rewarding. "I'm usually able to point people in the right direction even if I can't fully solve their problems," he says. "I find that a lot of the courses I took a year or so ago have changed already. Some are more in-depth and others cover more material than I had."

Dan is partially responsible for the changes he sees in course work because of his position as student representative on the curriculum committee. He says, "I try to bring the students' viewpoints to the changes that are occurring all the time in our curriculum. Every other year, the committee examines and evaluates all courses being offered in the department. Between times, they decide on experimental courses to be offered for a term, they take out courses they see as no longer relevant to the job market and they constantly evaluate and plan for new courses. It's reassuring to know that the education we're getting from the department is as well thought out and current as it is."

Dan has received the Henry M. Black Scholarship Award and the Honeywell Award.

Raymond A. Engel Laboratory . . .

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people who, with their Iowa State educational experience, would be valuable and important members of his company's research, engineering and management staffs. I feel certain that Raymond Engel would have approved of our initial thrust for the laboratory. We plan to create a facility where we can instruct and carry on research in computer-integrated design and manufacturing.

Establishment of the laboratory is made possible by Kathryn A. Engel, who gave the department a gift of $800,000 to be added to an earlier endowment which she and Engel created several years ago. Her gift brings the Kathryn A. and Raymond A. Engel Endowment to $1 million. Said Gordon Eaton, "Raymond Engel was a sensitive businessman, advocate of higher education, alumnus and friend of the university. He devoted his energies and his resources to the College of Engineering, helping assure an education grounded in excellence for all its students."

Raymond Engel began his career with the Perfection Stove Company of Cleveland, Ohio, but within a year, he moved back to Iowa and began a career with the Fisher Governor Company in Marshalltown, where he remained until his retirement in 1969. Beginning as a research engineer assisting in development of new products, Engel rose to become vice president in charge of engineering and production and was a director of the company from 1944 until his retire-

Congratulations are offered by Richard J. Doyle (left), president, Borg-Warner Automotive, Inc. to ME graduate student Jeff Trom as the first recipient of the company's $5,000 scholarship. The award, administered by the Society of Automotive Engineers, was recently presented at special ceremonies held at the university. Trom, a candidate for a doctoral degree at ISU, is conducting basic research on nonlinear coupled differential equations for use in control systems in vehicle suspensions.

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The Humanities And Mechanical Engineering

A 22-foot tall, 30-foot long, high strength aluminum sculpture entitled “Caram” now stands in the Herbert J. Gilkey Court in front of the Henry M. Black Engineering Building. The sculpture was commissioned by the Iowa Art in State Buildings’ Program and was selected from 800 designs submitted for consideration.

Says Bruce White, professor of art at the University of Northern Illinois and creator of “Caram,” “This piece was conceived after I became familiar with the nature and extent of studies and activities within the new building. The sculpture was made by bending, cutting, slicing, stressing and twisting a single sheet of material.”

Black-Hilstrom Fund Grows

While most of this newsletter is devoted to news of the dedication and naming of our building and the establishment of the Engel Laboratory, I want to express the department’s deepest appreciation to all alumni who have loyally and continually supported us. At this time the Black-Hilstrom Fund contains more than $457,000 and is earning 9.50 percent interest per year. When we can top $500,000, the ISU Achievement Foundation will pay 10.25 percent interest on our principal, increasing the value of our endowment’s yearly worth.

Your support is making it possible for us to continue building on the efforts of my predecessors, Henry Black and Arthur Bergles, to ensure the reputation and quality of the department. Some recent uses of the interest we earn from the Black-Hilstrom Endowment are:

1. Moving expenses for new faculty members (not covered by state appropriations).
2. Sending faculty to visit companies who are supplying us with CAD/CAM equipment and helping us develop our own CAD/CAM facilities.
3. Bringing in nationally recognized speakers for seminars.

In our next “ME UPDATE,” we will list all new members of the Black-Hilstrom Club and share the names of 1986-87 donors. In the meantime, we thank each of you who has given to the department. Your gifts are working to keep the department strong.

James Bernard
Chairman

Stories To Look For In The Next “ME UPDATE”

More on the Raymond A. Engel Mechanical Engineering Laboratory

* * *

A Robot from General Electric

* * *

Dynameters from John Deere

* * *

New Facilities: Water Channel, Turbo Lab, Heat Transfer Lab

* * *

Details on the Black-Hilstrom Fund and Listing of Donors and new Club Members
The Center For Historical Studies Of Technology And Science Established

A link between the College of Engineering and the humanities at Iowa State has been forged by the recent establishment of the Center for Historical Studies of Technology and Science. The center seeks to build on ISU's tradition of excellence in scientific and technological fields. By collecting, organizing, and studying records of scientists and scientific businesses and associations, Iowa State can become the nation's leading institution for historical studies of technology and science. According to Alan Marcus, the center's director, center activities will enable the university to attract top graduate students and become the national focal point for this kind of research.

Marcus explains that the study of the history of technology and science is well-founded at Iowa State. He says, "Technological history was first taught at ISU some 25 years ago and it started in the Department of Mechanical Engineering. Professor Eugene Ferguson was the first to offer the history of technology as an undergraduate course. This course has been offered continuously since then and has been taught by a number of people including Dr. David Wilson, who holds a joint appointment between the mechanical engineering and history departments."

One goal of the center is to establish a journal of the history of science and technology in America. Currently, there is no such journal covering both science and technology. Marcus feels that such a journal would be instrumental in providing an opportunity for communication among historians across the country. "It seems to me that Iowa State can become the focal point for such interaction, because of its archives, its faculty and its fine graduate program."

The center's artifacts will be stored in the Special Collections Department of the Parks' Library. This facility will provide the temperature and humidity control necessary for long-term preservation of manuscript collections. Graduate students will maintain, organize and research the records and objects collected. The center is looking for materials. Its particular focus will be on past technological developments in Iowa and the Midwest. If you would like more information on the center, you can contact Alan Marcus at 635 Ross Hall, Iowa State University, Ames, Iowa 50011, (515) 294-5956.

Engel Laboratory . . .

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ment. During his period of technical leadership, Fisher Governor became the world's largest exclusive manufacturer of automatic control equipment and the leader in research in this field. Fisher, now a subsidiary of Monsanto, has honored Raymond Engel by naming their Marshalltown research facility the R.A. Engel Technical Center.

Always active in professional associations, Engel belonged to the American Society of Mechanical Engineers, the American Society for Testing and Materials, Instrument Society of America, the Society for Experimental Stress Analysis, and the American Welding Society. He was named Honorary Initiate from Industry by the Iowa State Chapter of Pi Tau Sigma, was appointed to the Board of Governors of the Iowa State University Achievement Foundation and was named Cy's Favorite Alum.

In 1983, Raymond and Kathryn Engel presented Iowa State University with a major gift to establish a substantial endowment. The gift was given with only one restriction: that it be used solely to enhance the educational quality of the Department of Mechanical Engineering. It was the Engels' intent to help make sure the department would be endowed so that it could remain academically prominent. They wanted resources available to help make the atmosphere of the department conducive to outstanding work by the faculty and students. Their gift was an investment in people and in academia. It has been used over the last few years for such things as helping young faculty develop their research programs, sending faculty to important technical conferences and seminars, supporting graduate student fellowships and purchasing and maintaining equipment.

The connected lives of Henry M. Black and Raymond and Kathryn Engel provide a study of what inspired leadership and thoughtful giving can do for higher education and for all of us who benefit from it.
Here we are! The Department of Mechanical Engineering including faculty, graduate students and staff pose outside the Henry M. Black Engineering Building.

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ISU Achievement Foundation
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