

From the College of Engineering News

University of Missouri-Columbia

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Waidelich Receives Halliburton Award

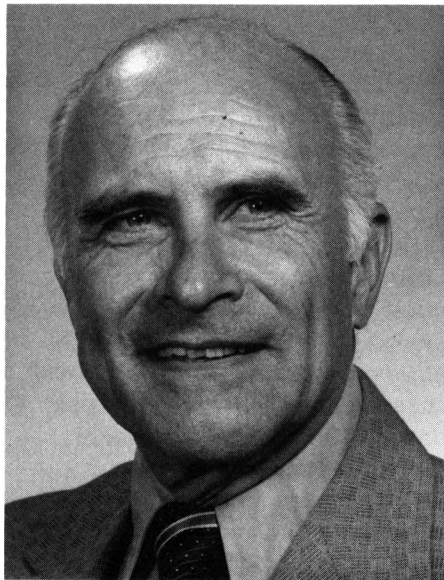
Prof. Donald L. Waidelich received the \$1,000 Halliburton Teaching Excellence Award annually bestowed by the College at the awards banquet March 4.

Waidelich has been a member of the UMC electrical engineering department for 45 years. The author or co-author of nearly 150 papers, he is an internationally known specialist in circuit design, radar and microwaves, non-destructive inspection of materials using electromagnetic methods, magnetic fields and communications technology.

Waidelich's faculty colleagues note that he is a "teacher's teacher"—many of his students have gone on to university careers in engineering where they have, in turn, inspired others to University careers. Another notes that his research abilities and experience are so great that his students have unusually strong preparation when they enter engineering practice. One faculty member notes that "no other

MAE's Braisted Resigns

Paul Braisted, chairman of mechanical and aerospace engineering, has announced his resignation from that post which he has held for 16 years. He says he "looks forward to contributing to the future growth and progress of the College." □



individual in the College has had a greater positive influence on the lives of so many students."

Students cited Waidelich for his thorough instruction with detailed, up-to-date examples from the state-of-the-art. They credit him with providing generously of his time for students who need additional help, always maintaining a congenial, respectful attitude. One former student observed, "While he was certainly the most demanding teacher that I encountered in graduate school, his inspiration and example provided a love for the practice of engineering that serves his students well throughout their professional life." □

The Halliburton teaching excellence award is enabled by a grant from the Halliburton Foundation, whose parent company is an international diversified oil field services and engineering construction organization. □

TI Gives EE Computer System

The electrical engineering department has received \$125,000 in computer equipment from Texas Instruments, Dallas, Tx., to expand its student computing facilities.

The gift is a TI DS 990 Model 26 Multi-User System. The firm also donated necessary peripheral equipment including discs, printers, and software.

The electrical engineering department, offering degrees in both electrical and computer engineering, has the largest student enrollment in the College of Engineering. It is the second largest department on the UMC campus. Thus, its computing requirements are correspondingly great. □

Fact Forum

Women continue to choose engineering as a career. They now represent nearly 15 percent of UMC undergraduates in engineering, up from 10 percent just five years ago. □

Engineering "Rapid Fire"

Dean William R. Kimel has received the Award of Merit from the Engineers' Club of St. Louis. The citation was "for outstanding performance or contributions reflecting credit to the engineering profession or the Engineers' Club of St. Louis."

Melford E. Monsees has been elected to Fellow of the American Society of Civil Engineers. He was cited for his contributions to the professional education of young engineering practitioners and for his efforts to continue the training of mature engineers. Monsees serves as director of graduate engineering for the College's program serving the Kansas City metro area.

Sudarshan K. Loyalka, James C. Dowell Professor of Engineering, has been elected a Fellow of the American Nuclear Society. Loyalka is a basic researcher, interested in the motion of neutrons, molecules and aerosols and the principles of heat/mass/momentum transfer in solids and gases.

C. LeRoy Day has been named "Outstanding Individual of the Year" by the Missouri Section of the American Society of Agricultural Engineers. Day, former chairman of the agricultural engineering department, was cited for his contributions to the profession. He is teaching in the department and is the principal investigator for UMC's "Integrated Farm Energy System" research project.

Richard Hoft, Chance Professor of Engineering, was on sabbatical in Japan during the winter semester 1983. He presented two keynote addresses at an international conference and delivered a major address at Toshiba, the "General Electric of Japan." He also served for one month without salary as guest research fellow at the Institute of Industrial Science, University of Tokyo. Hoft is a specialist in power electronics and electrical drives.

Robert Leavene, associate professor of electrical engineering, has been honored as one of 10 outstanding IEEE branch counselors or advisors nationally and internationally. IEEE's Student Activities Committee praised UMC Engineering's outstanding branch and noted it is "in large measure attributable to Leavene's motivation, dedication and leadership." Leavene

received a \$500 check and a framed certificate.

James M. Beauchamp, who retired Aug. 1, 1982 as professor of industrial engineering and director of continuing engineering education, and **Donald Brooker**, who retired Sept. 1, 1982 as professor of agricultural engineering, have been named professors emeritus by the Board of Curators, retroactive to their retirement dates. □

Hydraulic Expert Develops Simple, Cheap Waterlifter

A new pump powered by water alone could turn thousands of small dams in the U.S. and elsewhere into productive electric power plants or pumping stations, conserving valuable energy, believes civil engineering professor Henry Liu.

"The Cherepnov lifter requires no outside power source, has only a couple of moving parts and operates quietly and automatically," says Dr. Liu, who perfected the design, which is based on a little-known Russian concept. The U.S. Department of Energy funded his research.

In its simplest form, the lifter consists of three tanks, two just below the level of the impounded water, the third at the base of the dam. Water flows from one of the top tanks to the bottom tank, compressing the air in it. The compressed air is routed to the other top tank, where it forces the water in it up and out. Then the bottom tank drains, refilling with air, and the cycle begins anew.

"We are using water to pump water," Liu says. "For a dam five feet high, one lifter can move the water nearly five feet higher than the dam's original water level. And with a series of lifters, water can be pumped to almost any height."

Of course, this increase doesn't come from nothing. Half the water that passes through the lifter is discharged downstream after its

energy is used to raise the other half. But, then, the water is free.

"Since there are thousands of small dams in the U.S., 4,000 in Missouri alone, doing nothing more than holding back water, the Department of Energy is interested in ways of turning them into power producers. That is why they sponsored my research," Liu says.

Using the Cherepnov lifter to, in effect, increase dam height is

(Continued on p. 5.)



Liu and his waterlifter

Retzloff Seeks Corrosion Preventive

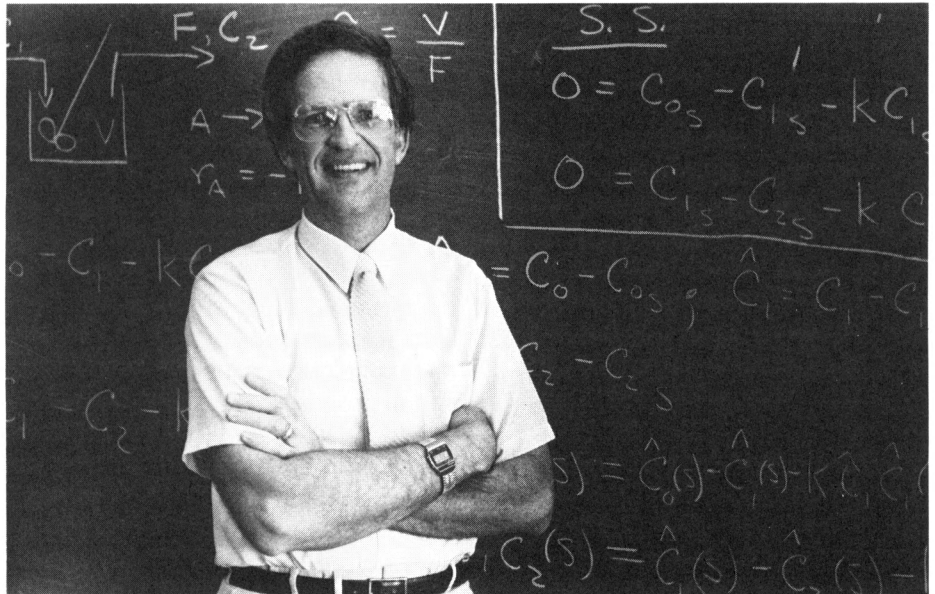
When David G. Retzloff talks about going back to the basics to study corrosion, he *does* mean reading, writing, and arithmetic. Reading through volumes of research data already gathered, writing observations and comparisons, and then doing the arithmetic to see how it's all connected. Retzloff, assistant professor of chemical engineering, says "there seems to be a fair amount of experimentation on corrosion, but not a very good idea of what it all means."

So, instead of adding more layers of lab experiments and collecting more data, Retzloff has organized a team of chemistry and physics faculty to join him in reviewing other peoples' results. The research tools are pencil and paper, a computer, the library, and some high-powered thinking.

"Corrosion is a catch-all term," Retzloff says, "but it basically means what goes wrong when something degrades or fails. Probably the most familiar example is the corrosion of iron to ferrous oxide—rust."

According to Retzloff, the research goal is simple. "We're trying to explain why a material that normally is stable and should not change—changes to become less strong and less stable. Why shouldn't a bicycle left out in the rain stay intact as a piece of steel or chrome?"

Many people have characterized the surface of a metal before and after corrosive action. Now, people are trying to measure the intermediate chemical "species" or compounds that form during the process. It's the nature of those compounds plus the physical conditions at the microscopic interface between metal and surrounding environment that determine how corrosion proceeds. Retzloff muses, "If you can deduce what types of interactions are taking place right there in one or two atomic layers, you should be able to build mathematical equations to



describe categories of corrosion interactions."

"Once you reach that point," he goes on, "then you've got something! Once you really understand the intermediate interactions, you can then concentrate on how to interfere with them to slow corrosion down, or stop it completely." Retzloff points out "stopping corrosion is important. It's a multibillion dollar annual problem. Materials built to do a certain job are put into place in a certain environment. But quite often, that very environment degrades the material so that it fails to function as intended." Retzloff emphasizes this could happen "by rusting, or acid corrosion, or from nearby sources of pollution." This is why Retzloff and team figure that making sense out of research already completed is the key to understanding corrosion.

Of his back-to-basics approach Retzloff says "When we're finished, we'll be able to determine a cause-and-effect relationship between the environment and the way materials fail—specifically, what materials will be good under particular environmental conditions. That's opposed to actually going out and doing 100 expensive tests of different materials to find out."

Two important applications Retzloff sees coming. One is to explain what we know now, based on experience only. Why, for example, aluminum works better in one environment, stainless steel in another. The second, Retzloff emphasizes is that "as we go to new technology and we are asking new materials to stand up to environments we've yet to talk about—such as in space—we will be in a position to make fairly accurate decisions as to which metals or alloys to use."

The work has already paid off. The researchers have discovered a number of things that people up to this time haven't realized are true. "We simply point out the things that have either escaped other people's attention, or matters that simply haven't been discovered because nobody had a fundamental understanding of what is happening in corrosion. For example, we predicted what would happen if we changed the environment in terms of pH, a measure of acidity. We predicted how the corrosion rate would accelerate or decelerate if the pH were changed. We were within 3 to 5 percent of the actual development . . . amazingly good for the crude model we have." □

Astronaut Cites Space Program Benefits



Astronaut Jack Lousma delivered the 1983 Croft Lecture in Engineering Feb. 24 as an event of National Engineer's Week.

Col. Lousma was commander of the third test flight of the U.S. space shuttle Columbia, launched March 22, 1982, for an eight-day, 3.4 million-mile flight. He also piloted the 1973 Skylab 3 flight which orbited with a three-person crew for two months and 24 million miles. During the Skylab mission, Col. Lousma logged 11 hours in two walks outside the space station.

Lousma noted that he often hears comments critical of space expenditures during a period when people are without jobs. Yet he said the space program is getting the same number of real dollars as it did 15 years ago. "We give away in this country more than 50 times as much in direct payments to individuals as is spent on the space program . . . we spend on booze 15 times what the space program takes, three times that much on tobacco, three times as much on cosmetics. It's hard for me to get emotional or sympathetic with people who say we are spending too much on space."

He pointed to the benefits of the space program: "We are going to have to learn to use our resources more effectively and efficiently. The space program is teaching us more about earth's resources . . . minerals, agriculture, forestry, fresh water resources, oceans, atmospheric conditions and how to control the problems of pollution. A whole phone book of innovations has come our way as a result of the space program."

And, he warned, "We need the space program for national security. It's important that we not allow another power to be better in space than we are. Whoever controls space can intimidate the world."

But there are also "great opportunities for international cooperation. The LANDSAT program provides earth resources information to 120 countries to help them improve their quality of life and standard of living." Lousma conceded wistfully that the ideal of international cooperation is hard to achieve. "From space we couldn't see the boundaries that separate countries. It made us realize that boundaries are put there by people in their inability to get along with each other. The boundaries weren't there when God created the earth. In flying around the world in such a huge vehicle, the most sophisticated

(Continued next page.)

Career Path to Space Flight Described

Everyone knows that "having the right connections" makes everything easier. Col. Fred Cone, commanding officer of Naval ROTC, demonstrated the truism by calling on his old friend, Col. Jack Lousma, when an Engineering committee affirmed it would like to have an astronaut as Croft Lecturer.

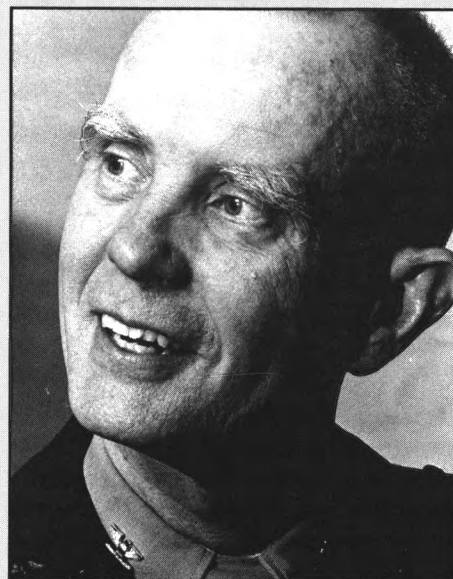
Lousma and Cone have remained close personal friends since 1962 when they started Navy Postgraduate School together and subsequently served as pilots in the Second Marine Air Wing, Cherry Point, S.C. In 1965 Col. Lousma entered the astronaut program; Cone went on to serve two tours in Vietnam.

Col. Cone noted that a definite career path has been established for military personnel to enter the astronaut program. "An ROTC student must request flight school after graduation and commissioning. Then comes service as a pilot or naval flight officer for three years. The next step is test pilot training. Finally, most of them go through post graduate school or obtain an advanced degree in engineering."

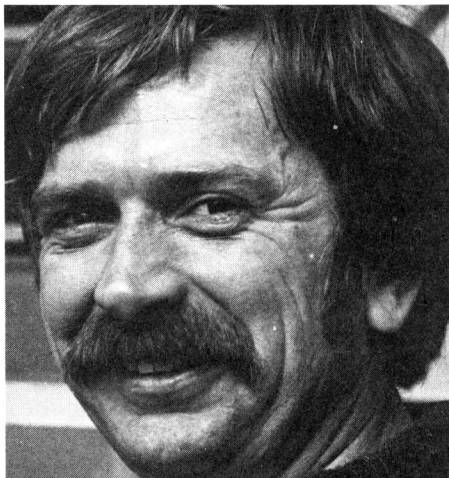
If they are accepted into the astronaut program, each is assigned

to work on a program associated with the space program. For example, Col. Lousma was assigned to the Command and Control Program, where he worked on ceramics for the heat shield and on the robot arm which performed a number of tasks during his flight on the shuttle "Columbia."

Lousma met with a number of interested ROTC students about the astronaut program during his UMC visit.



Col. Fred Cone



Staff Receive Service Pins

Three engineering staff mark a decade of service this year. From

left: Jim Burnett, senior electronics technician, nuclear; Dianne Robinson, departmental secretary, mechanical; John McCurdy, electronics engineer, mechanical.

Not shown: Wanda Gooch, clerk II, Experiment Station, 20 years' service. □

Waterlifter

(Continued from p. 2.)

important because low-head (height) dams aren't economically competitive electric power producers.

Turbines have to be relatively large in low-head dams, and that increases the cost. Raising the head increases the force of the flowing water so smaller, less expensive, turbines can be used, Liu says.

But pumping water for irrigation, drinking and sanitation may prove to be the Cherepnov lifter's real strong point, the engineering professor believes.

"In many developing nations, water is plentiful, but pumps and the fuel to power them are expensive or unavailable. With the Cherepnov lifter, farmers could irrigate their fields or pump water to their village for virtually nothing," Liu says.

With three 55-gallon drums and some inexpensive pipe, a system could be built that would serve the drinking and sanitation needs of up to ten families.

The lifter also has many potential pumping applications in developed countries. Costly, energy-consuming pumps could be eliminated from many irrigation systems with the use of large Cherepnov lifters, Liu believes. They could also make

irrigation feasible in areas far from existing power lines, he adds.

Large or small, for power production or pumping, the Cherepnov lifter requires virtually no maintenance. The only moving parts are two check valves, which consist of hard rubber balls positioned inside the pipes. Because of their design and the motion of the water, the valves are self-cleaning and seldom require any attention, Liu says.

"Several organizations, here and abroad, are interested in the lifter," Liu says. "I think we may be seeing many Cherepnov lifters in use in a few years, especially if energy costs continue to rise." □

Astronaut

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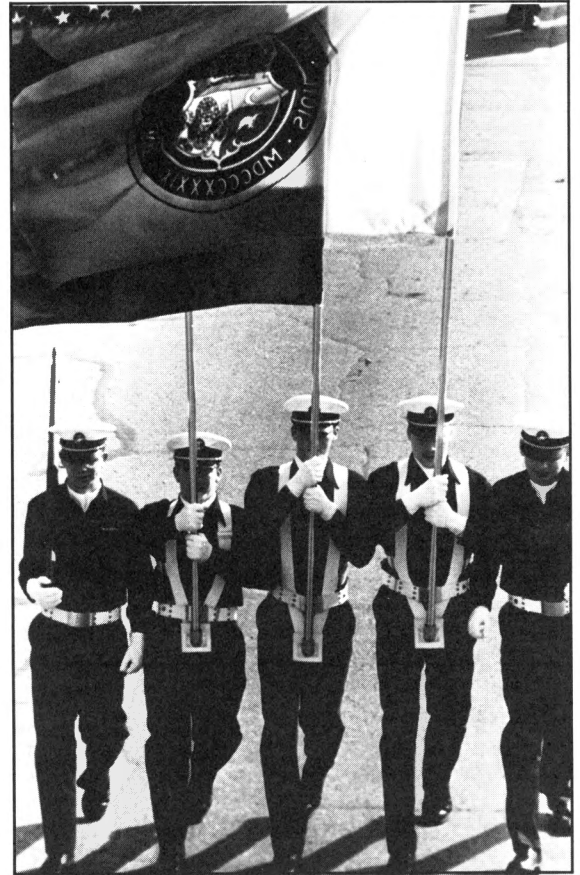
technological invention ever put together by humans, we flew over land where we knew wars were going on, blood being shed. Places where people have never had a square meal or proper medical attention and never will. With all our technology we're incapable of solving those problems for people living on this small planet. How much time each of us spends involved with trivia and wrapped up in ourselves when there are so many greater

things we could be doing to help those people!"

Lousma said that the next logical step in space is a space station. "We hope that the Congress and the people will buy the idea of a space station. NASA is in the process of defining what this space station ought to look like. We're scouring the user community across the U.S. and around the world to see who wants to use it for what, what it ought to look like, what its capability should be. We expect that it will be hauled up by the space shuttle in modular form, will be put together in

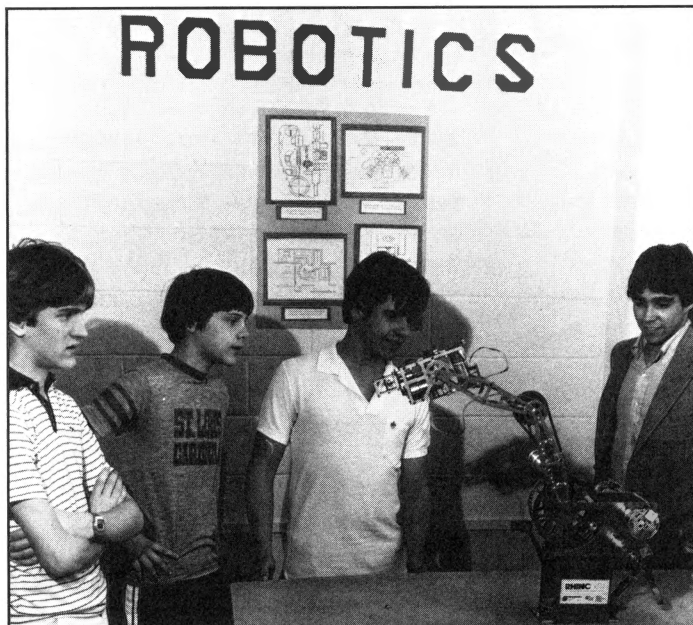
space over several years' time and eventually will accommodate 10-15 people who will stay three months or so at a time and we'll be able to fly the people back and forth. We think it's a good investment and could further international cooperation."

A member of the U.S. Marine Corps, Col. Lousma was one of 19 astronauts selected by NASA in 1966. He served on the astronaut support crews for Apollo 9, 10 and 13 missions and also as pilot of the backup docking module in the U.S./U.S.S.R. Apollo-Soyuz mission in 1975. □



Naval ROTC led parade with the colors.

1983 St. Pat's Week



The Honored Visitor from the Auld Sod again spread his blessings on the College, as he has done for 80 years. Mild weather encouraged spirits, and turnout was heavy for the baseball and football tourney. Downtown Columbia enjoyed the color and music of the second annual Engineers' Parade. Showers at the last moment forced the Knighting Ceremony inside, but nothing dampened spirits at the Coronation as electrical/computer engineering major Katie Viehmann was crowned Queen of St. Pat's Week. □

Left, lab exhibits for the public.

—Missouri Honor Awards Presented—

Four prominent engineers, three of them alumni, received the Missouri Honor Award for Distinguished Service in Engineering in ceremonies March 4 during St. Pat's Week.

The four are James M. Beauchamp, Jr., retired professor of industrial engineering and director of continuing engineering education, UMC; John E. Breen, professor of civil engineering at the University of Texas-Austin; Kenneth E. Kalen, president and chief operating officer of Panhandle Eastern Pipe Line Co. and Trunkline Gas Co.; and R. Max Peterson, chief of the U.S. Forest Service.

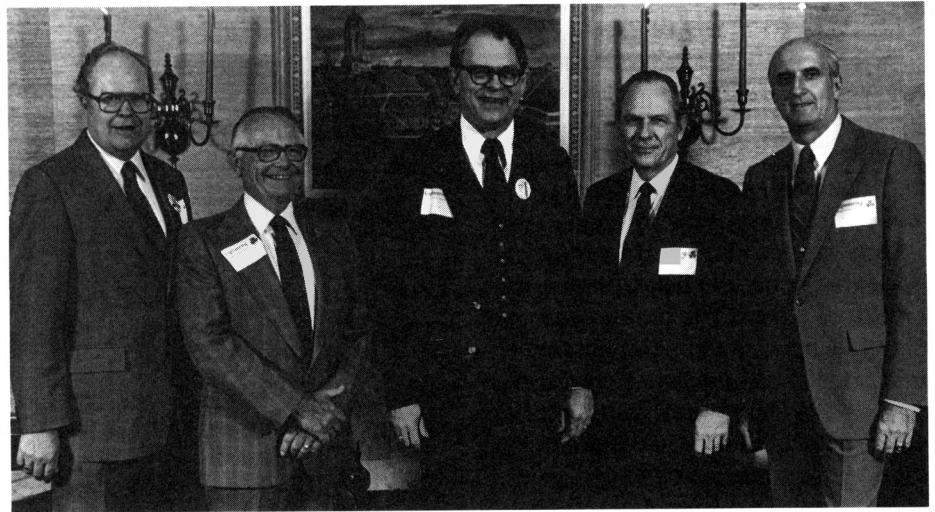
Beauchamp served UMC Engineering for 23 years, beginning as a faculty member in industrial engineering and later moving into administration. He was one of three top administrators in the College, assisting with program planning, budget and fiscal operations, public information and public relations, faculty evaluation, alumni relations and professional relations. He also helped establish and guided the growth of the College's graduate and undergraduate programs in the Kansas City area. In addition, he was responsible for the expansion of the College's continuing education programs for practicing engineers, technical specialists and the general public.

Breen, who is Carol Cockrell Curran Professor of Engineering and director of the Ferguson Structural Engineering Laboratory at the University of Texas-Austin, received the master's degree in civil engineering from UMC in 1957. He is noted for reinforced and prestressed concrete research and development. He played a key role in design and construction of the U.S.'s first segmentally constructed, post-tensioned box girder bridge; he frequently serves as a consultant on major bridge and building projects. He has won numerous national and

international awards for his concrete work and is a member of the National Academy of Engineering.

Kalen received his bachelor's degree in civil engineering from UMC in 1949 and has been with Panhandle Eastern since then. As one of the parent corporation's top executives, Kalen is responsible for securing adequate natural gas supplies for homes and industries in a large portion of the Midwest. He has guided the company's participation in the \$40 billion

Service in 1979, the first person with engineering training to lead that agency. The Service manages 190 million forested acres with an annual budget of more than \$2 billion. He has been involved in introducing better management practices into the Forest Service, guiding important forestry legislation through the Congress and involving the U.S. more closely with world forestry groups for the protection and conservation of world forest resources.



From left: R. Max Peterson, James M. Beauchamp, Dean William R. Kimel, Kenneth E. Kalen and John E. Breen.

Northern Border Pipeline, which will connect new Canadian gas supplies to U.S. markets. He has been involved with the development of design and engineering criteria for construction of this pipeline system in an arctic environment. Another of his challenges is financing for the pipeline, the largest privately financed project in history. He is also helping oversee construction of a \$508 million facility in Lake Charles, La., to regasify liquid natural gas to be delivered from Algeria.

Peterson received his bachelor's degree in civil engineering from UMC in 1949 after which he joined the Forest Service. Rising through progressively more responsible positions, he became chief of the

The honor awards have been made since 1951; since then, 140 distinguished individuals and organizations have been cited for their contributions to engineering excellence. □

Free Book Available

The genesis and growth of UMC Engineering is traced in a fascinating way in the hardbound "History of UMC Engineering" by M.P. Weinbach. For your free copy, while supplies last, write to: Dean of Engineering, 1010 Engineering Building, UMC, Columbia, MO 65211. □

An Engineers' Engineer: Ser

Paul Doll looks around his tiny office and smiles. The electric-blue concrete walls are neatly hidden by plaques and pictures. As he sits behind a beat-up desk, also covered with memorabilia, he points to the wall. "I don't know what you call that thing," he says mischievously. "But it holds all my honors. There are 105 of them."

You could call it a lifetime. A piece of wood is attached to the wall and hinged panels swing from it. The awards are catalogued like a library: government, health, church, technical societies, agricultural engineering, University of Missouri, professional societies, youth, civic and legislation.

"Now if you want to know me you'll have to take a look. *That* is Paul Doll."

His silver-gray hair and wrinkled hands don't conceal his excitement in just being alive. His green eyes sparkle with warmth and intelligence; you can tell he is a man who enjoys people. He's retired now, but for 22 years he was the executive director of the Missouri Society of Professional Engineers. But his awards are not from his job. He simply enjoys his honors, just as he enjoys the work that earns them.

"My point of view is this: A man should serve where he's asked when he possibly can. If peers come knocking on the door, you should serve if it is in the line of your ability, care and concern."

Doll says he is a simple man. He likes to refer to himself in the third person, and, although he says he's never really thought about it, says he guesses it's a form of modesty. He leans forward to stress his point. "I feel a man should live modestly and honestly, make a living and have a wife and family." He's been married to Meg 43 years, and people say you can't think of one without thinking of the other. They have two daughters and one son, and are "prouder than a hound's tooth" that they and their

children graduated from the University of Missouri-Columbia.

But Doll says life is more than an education and a family. "Each person must contribute to the betterment of the human race. That is why I'm an engineer, because we try to improve the quality of life."

Paul Jobe, who in 1976 took Doll's place as executive director of MSPE, thinks Doll epitomizes the image of a professional engineer. "He has a firm belief that professional engineering can play a role in the betterment of man. There is no doubt among the membership that Paul *is* MSPE."



"I remember when Paul came in as executive director," says Robert Hunter, chief engineer for the Missouri Highway and Transportation Department and Doll's close friend. "When we hired him he wanted to keep his old job, too. He was one of these fellas who got up real early and had the job done by 8:30 in the morning. Then he had to look for something to do for the rest of the day."

Doll's ambitious drive began in northwestern Missouri on a Colwell County farm. He has a deep respect for his mother, who died at age 102 four years ago. "I guess I have a famous family," he says as he picks

up a yellowed newspaper article and looks at it closely. "My mother was written up in the *Kansas City Star* because my father died when I was young and here she was, raising this family all by herself." They were the fourth generation on the Doll homestead.

"I went to Kidder College, and I'll bet you never heard of that," he says with a twinkle in his eye. "It was in Hamilton near our farm. It went bankrupt the year after I graduated."

Hamilton wasn't big enough for the likes of Paul Doll, so he went to the University and got his B.S. in

agricultural engineering in 1936 and his M.S. in agricultural engineering in 1937. He worked for the University Extension Service, the State Department of Resources and Development, and the Missouri Limestone Producers Assn. before coming to MSPE in 1954.

The University is still close to his heart and so is engineering. He is a life member of the American Society of Agricultural Engineers and the National Society of Professional Engineers. He is also on the advisory councils for the agricultural engineering department and the College of Engineering. He received the distinguished Faculty-Alumni

vice the By-Word of His Life

Award in 1973 and has received five other University awards. The department of agricultural engineering named a scholarship for him in 1979 to recognize his support for the department and his founding of Alpha Epsilon national agricultural engineering honorary, Agricultural Engineers of Missouri, Inc. and the Agricultural Engineering Building Steering Committee.

But Paul Doll's main contribution in life is not the fact that he serves on committees. He is a devoted advocate of the human race, and that shines through all of his work.

David Lillard, partner and personnel manager for Black & Veatch consulting engineers, Kansas City, was president of Missouri Engineering Alumni in 1974. "Paul Doll is the kind of person that makes everyone feel better about themselves. To Paul, all people are people."

Hunter says, "Even walking down the street is an experience with Paul. There's never a dull moment. If you go into a restaurant and sit down and the waitress comes to take the order, he'll give her the third degree. But no one ever takes offense because he's so congenial about it. In a few minutes he knows that girl better than she knows herself."

Doll says he just enjoys being with people, seeing what makes them themselves. Hunter and Jobe have traveled with Doll frequently, and his questions never stop then, either. With Jobe, the subject was history on the highway. "He'd ask, 'What's the next county seat? What's the next county line? Do you know what this town is famous for?'" Jobe pauses. "He always knew."

"There was never a quiet moment," Hunter says. "He was continually questioning me about this or that: 'What are you doing here? When is this road going to be finished? When do you start this one?'" He throws up his hands in mock dismay.

Doll denies nothing. "I've been in every state in the nation, and I've driven around all the capitals except Idaho's," he says proudly. The Dolls love traveling; family vacations were common when their children were growing up. "We all really like to travel. Our big annual trip was to St. Louis to see all the sights. And of course, we always saw Missouri football," Mrs. Doll says with a smile.

"One little habit Paul has," Doll says. "I'm trying to walk around all the major football stadiums in the United States."

Football stadiums aren't the only places he walks. Doll had a massive heart attack in 1971, just after a Missouri football game. Now he walks a lot. Lillard says, "I think his goal is 1,000 miles a year. He keeps us all posted. Sometimes he'll write, 'Well, I've reached Anchorage, Alaska.'"

He had to miss the 1971 season because of the heart attack, but other than that Doll has not missed a home game since he bought his first season ticket in 1939. Since he couldn't see the Tigers play in '71, some quick thinking brought an alternative: the Tall Tigers. College of Engineering Dean William R. Kimel says, "Each summer he sends a postcard asking you to rank Big Eight football teams for the following Fall. You'd better do it if he sends it to you, or he'll track you down."

Doll explains the Tall Tigers proudly. "Only 100 people are on the list, and they're all rabid Missouri fans. When it started it was just engineers and some of them are still on it, but it's quite an elite group. The governor's on it, and so is Herb Schooling (former University chancellor). Everyone has to guess in advance of the season how the Big Eight will rank and what the game scores will be. At the end of the season I send a letter to all 100 people, telling who won and what everyone's score was. You can score genius, expert, so-so or go

take a shower." He laughs. "Even Chancellor Uehling took a shower last year."

The prize? "Oh, there is no prize," Doll says seriously. "It's strictly the honor."

That chivalrous, almost fiercely guarded honor is what makes Doll a leader. "I don't know that anybody's ever said anything derogatory about Paul Doll. People may disagree with him, but they'll always respect him," Hunter says.

Even Chancellor Barbara Uehling has disagreed with Doll. Day tells the story. "Paul founded our building fund steering committee and still serves on it. Well, the chancellor wanted funds for the library. Of course, she knows his support is for a new ag building, but he said, 'Chancellor, I'm supporting the library, too.' The chancellor kissed him on the cheek—laid one right there."

Hunter says, "He's sharp, interested in people and in the world about him. He's been a positive influence in my life and I look on him with respect and admiration. A lot of guys in this state can say that."

MSPE has certainly grown with his leadership; he increased the membership from 1,000 to 3,000 while he was in office. "He has provided a lot of background and motivation for all of us," Kimel says. Doll placed a strong emphasis on young engineers, recognized schools for improving the profession and encouraged engineers in community involvement and family life.

"I first knew him as a young engineer. He convinced me I could take a leadership role I might not otherwise have taken," Lillard says. □

Taking AIM At Air Leaks

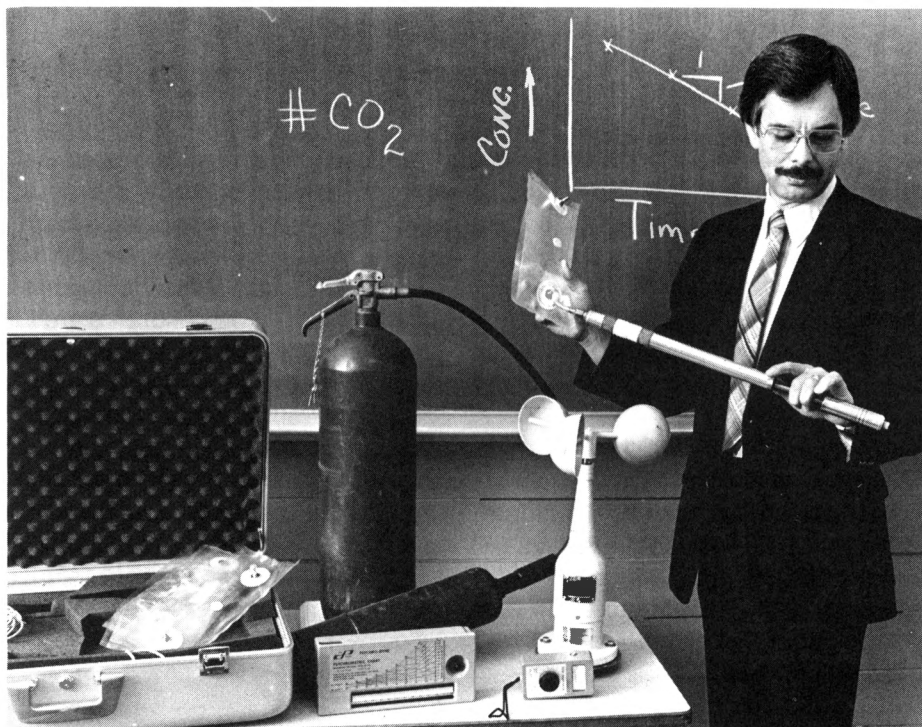
For the homeowner, air leaking in and out of a house is hard on the pocketbook. Air losses can cause the costs of heating and cooling a home to skyrocket. With that in mind, and with the backing of the Missouri Farm Electrification Council, UMC agricultural engineers have developed a portable kit designed to detect the movement of air into and out of the home.

The A.I.M. (air infiltration measurement) kit gives homeowners a chance to quickly and safely evaluate what is happening with air leakage in their homes, so that appropriate corrective action can be taken.

According to agricultural engineering chairman Neil Meador, traditional air infiltration measurement methods were both costly and complex. "What was needed," says Meador, "was a simplified technique that would reduce the cost, promote more extensive use of air infiltration study, and thereby help insure proper ventilation and energy efficiency in houses." The A.I.M. kit does just that.

Using grants from the Missouri Farm Electrification Council, graduate student Thomas A. Costello performed the initial research leading to the final kit design as part of his master's work in ag engineering. Costello's research focused on the use of carbon dioxide (CO_2) as a tracer gas for air infiltration studies. Work began in 1981 and was completed in the fall of 1982.

The result is A.I.M. Now, a concerned homeowner can call an agricultural extension specialist or a trained local electric utility representative to schedule a three-hour test at no charge. Although the kit is completely portable, the equipment involved is fairly complex, and requires a trained specialist to conduct the tests. All the homeowner



Meador with AIM kit.

supplies is the carbon dioxide gas from a home fire extinguisher.

Albert "Buddy" Garcia, one of the agricultural engineers who also worked on the project, says "The homeowner makes sure that all the windows and doors in the house are shut. Carbon dioxide is then released from the fire extinguisher." Using a hand-operated bicycle pump, the trained specialist captures air samples in special Tedlar sample bags made by Dupont. Several samples are taken over time, and the bags are mailed to the University for analysis.

"The principle is simple," says Garcia. "Following the burst of gas from the fire extinguisher, the concentration of carbon dioxide gradually dilutes out as the air leaks into and out of the house. We can measure how fast the CO_2 disappears, a direct indication of how 'leaky' the house is." This allows the homeowner to decide what repairs or weatherization efforts are necessary—such as adding storm windows, caulking, or weather stripping.

Some people apparently think that the amount of air moving in and out of a house, especially during the

winter, is pretty consistent. "That's a common misconception," says Garcia. He points out that the air loss varies tremendously, depending on the wind speed, the temperature outside, and the humidity. For that reason, the A.I.M. kit includes an anemometer to measure wind speed, a motorized psychrometer for determining the temperature and relative humidity, plus the pump apparatus and bags for taking air samples. Once corrective measures have been taken to reduce the air exchange, the homeowner is encouraged to reschedule the test under similar climatic conditions to check the effectiveness of those measures.

Meador, who supervised the project, emphasizes that using carbon dioxide makes the test relatively quick and safe. "Prior to the successful design of the A.I.M. technique," Meador says, "air infiltration studies relied on the use of rare tracer gases such as sodium hexafluoride. Since fire extinguishers can be obtained locally, the high cost of purchasing and transporting commercial gases is eliminated."

(Continued on p. 12.)

Alumni Schedule Regular Get-Togethers

If you like fried chicken and theme parks . . . and can arrange to be in St. Louis May 22, you won't want to miss the spring fling of the St. Louis Engineering Alumni Chapter. The \$12 charge buys you the day at Six Flags over Mid-America, parking and a fried chicken dinner—and lots of fun with St. Louis alums. They're inviting not only themselves, but alumni and friends from across Missouri or anywhere else, for that matter. If you can make it, ring up Lynn Frank at her St. Louis office, (314) 992-2004, for reservations.

St. Louis and Kansas City have active alumni chapters, St. Louis holding two meetings and Kansas City three meetings a year. Kaycee alums met for wine and cheese last fall and in February watched the basketball Tigers beat the Jayhawks. They'll meet once more this spring. St. Louis has its annual picnic

(transmuted this year into the Six Flags bash) and each fall meets at the St. Louis Engineers Club for dinner. If you're living in either of those metro areas, the chapters want to hear from you. St. Louisans should contact Ms. Frank at the above number. Kansas Citians should get on the horn to Merrill Watt, whose office number is (816) 333-4375.

St. Pat's Week each year sees the election of new officers for the statewide UMC Engineering Alumni Assn. Dave Neptune (BSCE 1967, MS 1968) is the new president, Bob Crabtree (BSCE 1953) is president-elect, Chester (Kit) Carson (BSCE 1966) is first vice president and Jack Sandridge (BSEE 1965) is second vice president. Membership chairman is Don Cahalan (BSEE 1962); Public Affairs, Jack Sandridge; Awards, Lynn Frank (BSCE 1978); and Nominations, Bob Girard (BSCE

1964).

As publicity chairman, Sandridge invites alumni to send him information for the newsletter. His address is 908 Devonshire Lane, St. Charles, MO 63301, (314) 946-4798.

In Passing

Vincent V. Holmberg (BSCE 1932) died July 28, 1982, in Gainesville, Fla. He had been employed by the Norfolk and Western Railway, the Chicago and Western Indiana Railroad and the Belt Railway Co. of Chicago. From 1951 to his retirement in 1978 he was employed by the Ellington Miller Co., Clarendon Hills, Ill. The firm specialized in general and railroad design and construction. Holmberg was vice president and vice chairman of the board at Ellington Miller.



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Join the Team!

Accolades for Alumni

John R. Kretzschmar (BSChE 1956) is serving as treasurer of the 25,000-member Society of Plastics Engineers. Kretzschmar is founder and president of Blako Industries, Dunbridge, Ohio.

Louis F. Trost (BSCE 1927) has been awarded life membership in the National Society of Professional Engineers and in the Virginia Society of Professional Engineers "for his services as a professional engineer and his efforts to elevate the profession." Trost is a resident of Hampton, Va.

Hobert W. Combs (BSEE 1958) has been promoted to district engineer at Union Electric's Lakeside District in Lake Ozark, Mo.

Ronald D. Affolter (BSEE 1976) and **David S. Hollabaugh** (BSEE 1976, MSNucE 1978) have been promoted to supervising engineers at Union Electric's Callaway Nuclear Plant in Fulton, Mo.

The Nooter Corp., St. Louis, has announced that **Kenneth J. Kolkmeier** (BSCE 1953, MSCE 1957) has been promoted to vice president-construction, in charge of all field construction originating from the firm's St. Louis office. **Vernon H. Thiemann** (BSME 1949) has been promoted to vice president-production engineering and

procurement. His responsibilities include the traffic department.

Alva K. Nakamura (BSEE 1965) has been selected Engineer of the Year by the Big Island Chapter of the Hawaii Society of Professional Engineers. Nakamura is manager of the engineering department for Hawaii Electric Light Co. He is presiding over Hawaii's first windfarm put into service in January 1983. He is also working to connect a 25 MW geothermal plant into the island's generating systems. **Arthur T. Isemoto** (BSCE 1946) is serving as deputy chief engineer for the Department of Public Works, Hawaii County, Hilo. Isemoto was honored

as Engineer of the Year by the Big Island Chapter in 1977.

Executive changes at Black & Veatch consulting engineers and architects, Kansas City, Mo., include **Robert J. McCloud** (BSCE 1954) promoted to head of the civil-environmental division, and **Raymond M. Butcher** (BSME 1948) promoted to manager of engineering for the power division. McCloud has been with the firm since 1957. Previously he had worked with the firm's special projects division at the AEC's Manhattan Project in Los Alamos, N.M. Butcher joined the firm in 1949 after an association with the Babcock & Wilcox Co. □

Air Leaks

(Continued from p. 10.)

To help insure complete safety, the kit also includes an oxygen deficiency alarm. If the concentration of carbon dioxide happens to get too high, and oxygen too low, breathing difficulties could result for people in the house. The oxygen alarm would then sound, warning the tester and homeowner to stop the test, and open the house up. Although it is highly unlikely that this would ever happen, researchers decided to add this feature as an extra safety precaution.

Meador feels that the usefulness of the A.I.M. kit goes beyond the savings it can mean to the individual homeowner. "Now we have a relatively inexpensive means of studying air exchange problems. The technique can be applied to any sort of ventilation problem, and could prove very useful to the home construction industry."

The kits are currently in use, and Missouri homeowners can now take "A.I.M." at the high costs of heating and cooling. According to agricultural engineering faculty, that makes a lot of "cents". □

News

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