

Impact

Fall 2005

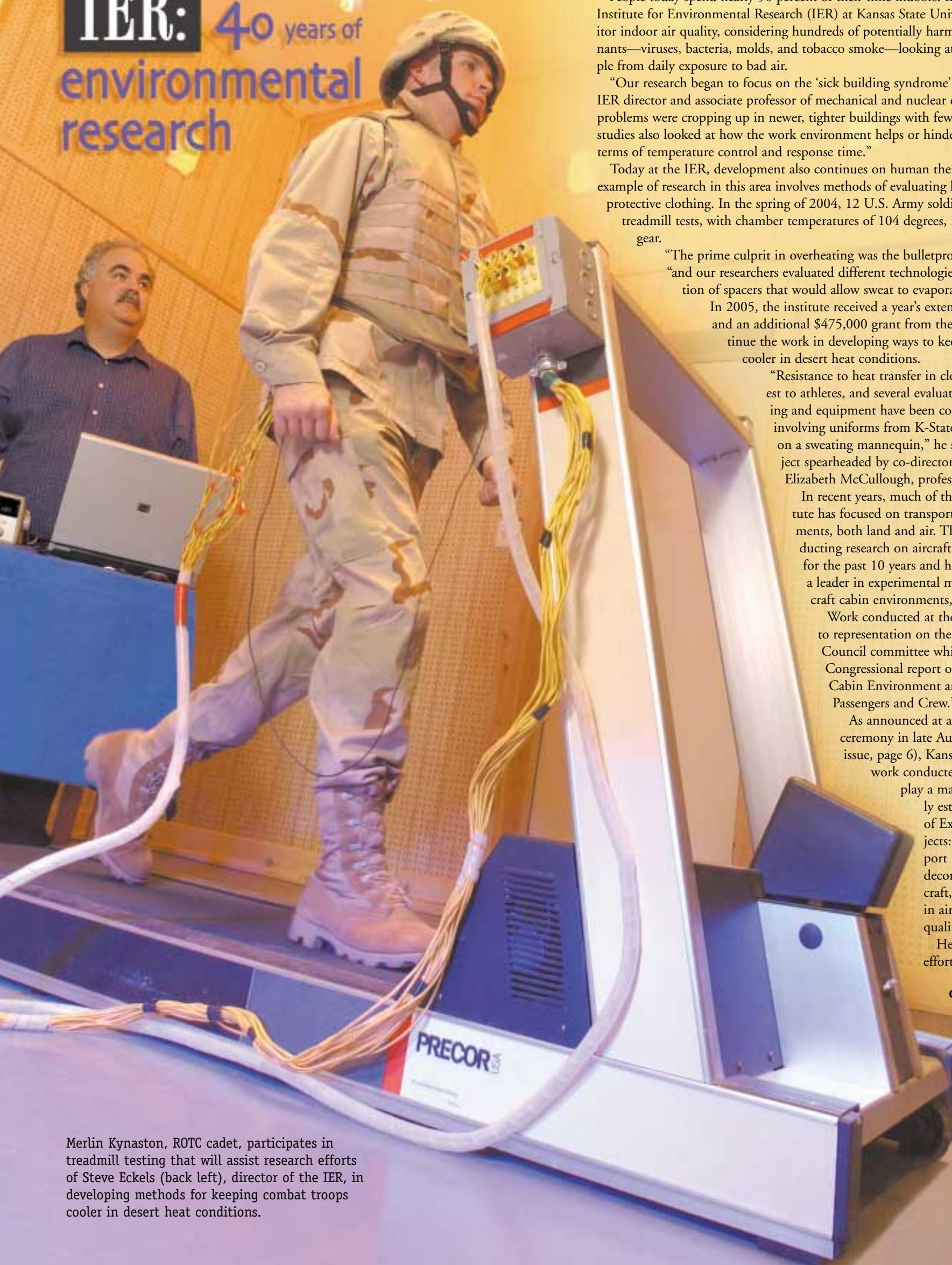


K STATE
ENGINEERING.

Impact

Fall 2005

IER: 40 years of environmental research



Merlin Kynaston, ROTC cadet, participates in treadmill testing that will assist research efforts of Steve Eckels (back left), director of the IER, in developing methods for keeping combat troops cooler in desert heat conditions.

The institute today

People today spend nearly 90 percent of their time indoors. In the 1990s, the Institute for Environmental Research (IER) at Kansas State University began to monitor indoor air quality, considering hundreds of potentially harmful air contaminants—viruses, bacteria, molds, and tobacco smoke—looking at the impact on people from daily exposure to bad air.

"Our research began to focus on the 'sick building syndrome,'" said Steve Eckels, IER director and associate professor of mechanical and nuclear engineering, "where problems were cropping up in newer, tighter buildings with fewer air exchanges. Our studies also looked at how the work environment helps or hinders productivity in terms of temperature control and response time."

Today at the IER, development also continues on human thermal comfort. An example of research in this area involves methods of evaluating heat stress imposed by protective clothing. In the spring of 2004, 12 U.S. Army soldiers participated in

treadmill tests, with chamber temperatures of 104 degrees, in full desert combat gear.

"The prime culprit in overheating was the bulletproof vest," Eckels said, "and our researchers evaluated different technologies, including the insertion of spacers that would allow sweat to evaporate more easily."

In 2005, the institute received a year's extension on this study and an additional \$475,000 grant from the U.S. Army to continue the work in developing ways to keep combat troops cooler in desert heat conditions.

"Resistance to heat transfer in clothing is also of interest to athletes, and several evaluations on sports clothing and equipment have been conducted at the IER involving uniforms from K-State athletic teams used on a sweating mannequin," he said. This was a project spearheaded by co-director of the institute, Elizabeth McCullough, professor of textile science.

In recent years, much of the research at the institute has focused on transportation vehicle environments, both land and air. The IER has been conducting research on aircraft cabin environments for the past 10 years and has established itself as a leader in experimental measurements for aircraft cabin environments, Eckels said.

Work conducted at the institute led K-State to representation on the National Research Council committee which prepared the 2001 Congressional report on "The Airliner Cabin Environment and the Health of Passengers and Crew."

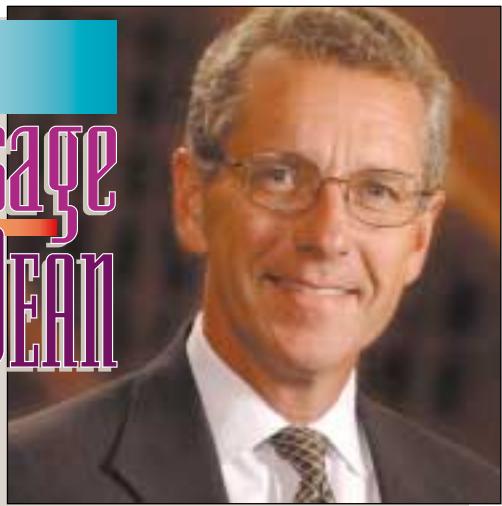
As announced at a special dedication ceremony in late August (see photo this issue, page 6), Kansas State, through

work conducted at the IER, will also play a major role in the recently established FAA Center of Excellence on four projects: contaminant transport in aircraft cabins, decontamination of aircraft, air quality incidents in aircraft, and in-flight air quality measurements.

Heading up this research effort are Byron Jones,

continued on page 7

Message from the DEAN



The world's economy is driven by science and technology at an ever-increasing rapid pace. According to the 2005 National Association of Colleges and Employers Job Outlook, six of the "Top Ten Bachelor's Degrees in Demand" are offered by our college.

Engineers make a difference, perhaps now more than ever, and it is our job to be about the business of educating young men and women who will go out and compete in this new global economy.

"Whatever career you choose, America and the world need your strong leadership . . ." This was the admonishment to the graduating class of 2005 from commencement speaker and College of Engineering alumnus Gen. Richard Myers.

The now retired Chairman of the Joint Chiefs of Staff further offered three key attributes necessary in taking on this leadership role: integrity; selflessness; and commitment, dedication and passion.

Gen. Myers clearly represents this definition of the successful engineer, as do our newly inducted Hall of Fame members, Professional Progress awardees, and Seaton Society members in general, who not only exhibit largess in their career accomplishments but in their generosity in giving back to this institution so the cycle will continue.

In our task of instilling these traits in today's students, the classroom experience is of course essential, but so too are outside team projects and competitions, involvement in professional societies, and professional experience in the workplace.

Thirty-five percent of our graduating seniors had been involved in team projects or competitions, 53% belonged to professional society student chapters, and 81% had gained professional experience prior to graduation. By any measurement standard, we are doing well in exposing our students to those circumstances and events that will engender development of the leadership and character traits needed in the 21st century.

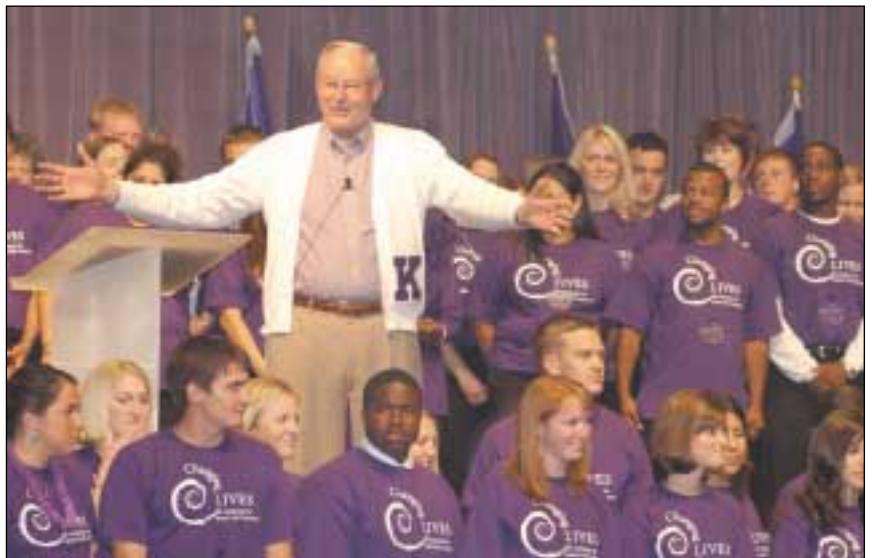
The College of Engineering, in taking part in the university's Changing Lives Campaign, will focus its efforts on enhancing resources for our students, faculty, and facilities. This will allow us to attract the best students possible to be educated

in our programs by funding increased scholarship support at the undergraduate level, graduate fellowships, and tuition waivers. We will recruit and retain the best faculty members in the field of engineering with increased endowed professorships and chairs, levels of salary compensation, and opportunities for professional development. We will construct and maintain the best facilities, a major part of a scholarly and learning environment.

We're doing well at following this outline now—our students compete and perform at the top levels, our faculty win prestigious awards, and we continue to bring in funding for groundbreaking research conducted in our laboratories, centers, and institutes. The future demands that we do no less. Our challenge is to do more.

Terry S. King

Terry S. King, Dean



Kickin' off the campaign

Rhea Serpan, EE '60, joins with K-State student leaders in challenging alumni and friends to meet the \$500 million goal of K-State's Changing Lives Campaign. Serpan emceed the kick-off event of the public phase of the campaign, held Oct. 7 in Ahearn Field House. He and his wife, Pat, are chairpersons for the West Region of the fundraising drive and are part of a group of 61 others who have already gifted at the \$1 million level. The College of Engineering's goal in the campaign is to raise \$75 million dollars, with a focus on student enhancement, faculty enrichment, research expansion, and facilities improvement.

Professional experience counts



Greg Huschka

"Promoting internships and co-op involvement is a priority for the K-State College of Engineering," said Richard Gallagher, associate dean of engineering for academics and administration. "Eighty-one percent of our 2004–2005 graduating seniors had obtained professional experience prior to graduation."

Mechanical engineering senior, Greg Huschka, was able to take his intern experience a step further and return to K-State with a scholarship bonus. His story follows . . .

Scholarship award for summer intern

Landing a summer internship with a top company is a much sought-after goal for many college students. But Kansas State University senior Greg Huschka received an extra bonus for his efforts—a \$5,000 Pella Corporation Grant Award scholarship to be used for his senior year of studies in mechanical engineering.

The Pella Corporation, Pella, Iowa, presented the scholarships for the eighth consecutive year to select students in its internship/co-op program at an appreciation banquet on July 28. From 49 such participants in the program this year, six were chosen to receive the scholarships based on accomplishments during their period of employment, demonstrated leadership, and personal interviews.

"Once you are hired," Huschka said, "your manager and mentor have the choice to nominate you for the award. After that you prepare a professional resume and go through a panel interview. One or more of the interviewers are vice presidents, so it's taken very seriously."

Huschka's internship was in the manufacturing and engineering services plant where projects involve improving the process of building, ordering, and maintaining equipment used to build the machines that make Pella windows.

"The Pella internship program is amazing," Huschka said, "in that they treat you like a starting engineer by giving you real projects and the authority to deal with them as you wish."

This was not Huschka's first experience with Pella, as he had also participated in their co-op program from May 2003 through January 2004, where he redesigned manufacturing line layouts to improve flow and accommodate new machines.

"I also led a five-day Kaizen team on a variety of topics. Kaizen stands for rapid improvement—something the Pella Corporation believes in strongly," he said.

"The co-op was also a great experience and something I think everyone should participate in."

—by Mary Rankin

On the cover:

Gen. Richard Myers, ME '65, chairman of the Joint Chiefs of Staff, meets with engineering students prior to graduation ceremonies. Myers delivered the commencement address to the class of 2005, May 14, in Bramlage Coliseum.

Insert right (left to right): Terry King, dean of the College of Engineering, Mary Jo Myers, and Richard Myers attend a dinner Sept. 10 at the home of Raj and Neera Singh, ChE '83, Alexandria, Va., to honor the Myers' on the occasion of the general's retirement from his post as chairman of the Joint Chiefs of Staff. Nearly 30 K-State alumni and friends joined the evening celebration hosted by the College of Engineering.



2005 College of Engineering teaching and research award recipients, left to right: David Pacey, MNE professor, James L. Hollis Memorial Award for Excellence in Undergraduate Teaching; Yacoub Najjar, CE professor, Myers-Alford Memorial Teaching Award and Presidential Award for Excellence in Undergraduate Teaching; Mo Hosni, MNE professor, Presidential Award for Outstanding Department Head; Medhat Morcos, EECE professor, Bob and Lila Snell Distinguished Career Award for Excellence in Undergraduate Teaching; Ronaldo Maghirang, BAE professor, Frankenhoff Outstanding Research Award; and Larry Glasgow, ChE professor, Clair A. Mauch Steel Ring Advisor of the Year Award.

Teaming Up

Twelve teams involving more than 140 students were recognized at the Fall Engineering Awards Banquet in late September. From a concrete canoe, to a solar car, to a water-spouting fountain, 35 percent of this year's graduates had participated in team projects/competitions while at K-State.

Team members across the spectrum were asked to comment on being part of a group effort. A sampling of that response follows:

Quarter-scale tractor design team

"The educational experience, business connections, and life-long friends make it all worthwhile . . . Many tractor team members owe their professional success in industry to their participation . . . which placed their names in front of many potential employers who sponsor the ASABE competition."

Jace Chipperfield, BAE, senior

Steel bridge team

"The steel bridge team gave me a chance to interact with upperclassmen and learn what is expected to excel as a student in engineering, and now I work with the lowerclassmen to teach them the leadership skills and motivation they will need to take their spot . . ." *Peter Clark, CE, senior*

"Students can stare at a book or a board all day and not learn as much as when they are responsible for designing and fabricating a project."

Blake Bretz, CE, senior

SAE Formula One team

"I have been able to increase my understanding of engineering by applying my coursework to designing and building the Formula car . . . I have met some really great people whose friendships I treasure . . ."

Mary Sprouse, ME, sophomore

Aero design team

"Working on the aero design team has been my greatest college experience. We often work late into the night and give up weekends and holidays. . . . We want to continue our tradition of success, and we really enjoy the challenge . . ."

Nelson Pratt, ME, senior

Mini Baja team

"Mini Baja does a good job of involving everyone . . . and allowing everyone to drive the car that they helped to build. This was a great opportunity to broaden my perspective of the fields of engineering, since I am not a mechanical engineer. I learned more at the competition than I did all year." *Alison Peterson, ChE, sophomore*

Solar car team

"I learned a great deal about working with and motivating people for a common goal. There are a lot of things you learn that one would never get in the classroom, but by far the most important is the chance to surround yourself with people who have the same drive for engineering that you do."

Matthew Dickson, ME, senior

Concrete canoe team

"Being a part of the concrete canoe team has opened doors at all levels of my college experience. From friends to teachers to jobs, opportunity is now knocking at my door." *Lauren Brown, CE, junior*

ChemE car team

"It gave me an opportunity to meet other students from my department . . . as well as to meet students from other curricula. The team gave me a chance to travel . . . The teamwork involved is a great way to show leadership, problem solving, and other important features companies may ask about during interviews."

Tyler Selbe, ChE, graduate student

"A lot of engineers don't work well with others and I think teams are a great way to teach those skills. Another impact for me would have to be leadership skills . . . It helped me to listen to suggestions and try to consider everyone's opinion equally as opposed to only doing what I thought was right."

Ty McGown, ChE, graduate student

—by Mary Rankin



Results from 2004–05 team competitions

- **Concrete Canoe Team**, participant, Mid-Continent Regional Conference of the American Society of Civil Engineers
- **Steel Bridge Team**, 2nd, Mid-Continent Regional Conference of the American Society of Civil Engineers
- **ChemE Car Team**, 6th, American Institute of Chemical Engineers "ChemE Car" national competition
- **Quarter-Scale Tractor Design Team**, 2nd, International Quarter-Scale Tractor Design competition
- **Solar Car Team**, 14th, North American Solar Challenge; award for the Most Alternative Fuel
- **Fountain Wars Team**, 2nd, American Society of Agricultural Engineers competition
- **Agricultural Technology Management Club**, 3rd, Outstanding Agricultural Mechanization Club competition
- **Mini Baja Team**, participant, Mini Baja Midwest
- **SAE Formula One Team**, participant, 2005 National SAE Formula One Competition
- **SAE Aero Design Team**, 3rd, SAE Aero West "Open Class" competition
- **American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Team**, 2nd, ASHRAE International Design Competition
- **Architectural Engineering Team**, 1st, SysTek Structure-Building competition

SEATON SOCIETY

Saturday, November 5
2005



HALL OF FAME



Left, the College of Engineering Class of 2005 Hall of Fame, distinguished inductees honored for their professional success and accomplishment, active involvement with and support of the College of Engineering, dedication to Kansas State University, and professional and public service. From left to right, back row: Greg Tucker, ME '78, director of business transformation for the California State Auto Association; William Clarkson, CE '49, president of Clarkson Construction Company; Dixon Doll, EE '64, co-founder and general partner of Doll Capital Management; and Carl Ice, IE '79, executive vice president and chief operations officer of the Burlington Northern and Santa Fe Railway Company; left to right, front row: Sue Barsamian, EE '81, vice president of Global Go To Market Strategy for Mercury; and Edwin Wambgsans, CE '62, founder of Western Summit Contractors, Inc.

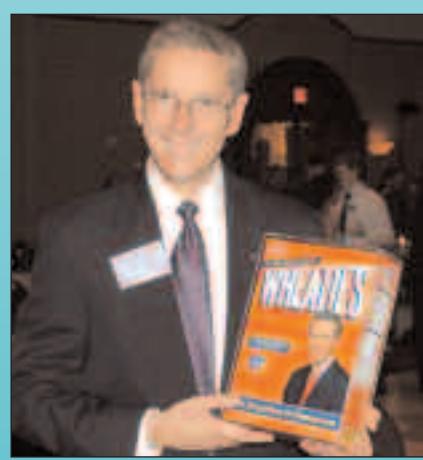


From far left: Anil Pahwa, interim department head EECE, left, and Warren, EE '65, and Mary Lynn Staley; Cassie Boyer, IE sophomore and student director of Seaton Society activities for Engineering Student Council; Larry Strecker, IE '80, COEAC chair, left, Mukta Pahwa, and Malgorzata Rys, IMSE assoc. professor; and Nadalie Bosse, IE '80, one of the alumni emcees of the evening.

Right, Helen Fairbanks, wife of the late Gus Fairbanks, long-time professor of agricultural engineering and member of the Class of 1989 Hall of Fame.



Above, Wayne Wittenberger, left, ME '42, visits with fellow ME '42 classmate, right, Thomas Jackson. The two had not seen one another in more than 60 years. Earlier in the day, Nov. 5, at the inaugural Seaton Society Founders Luncheon, Wittenberger had been recognized as a new Seaton Society Founding Member. Jackson was also introduced at that event as the honoree of the Thomas Paige Jackson Mechanical Engineering Scholarship, established by Wittenberger in Jackson's name.



Above: Terry King displays a cereal box mock-up, a gift from PPA honoree and General Mills executive, Kevin Schoen, proclaiming King "The Dean of Champions."



The Joe Anthon Group provide musical entertainment.

McGregor, McNeil win R&D 100 award for gamma ray detector

Douglas S. McGregor and Walter McNeil have a philosophy: use clever methods to keep things simple.

"You can always add more circuitry to make things complex, but that is just more to break down," McGregor said. "If we keep things very simple and use our knowledge of physics, it turns out that we can make



Gamma ray detectors

The invention, first introduced by McGregor, a Kansas State University associate professor of mechanical and nuclear engineering, and Ronald Rojeski, Rojeski Research Engineering and Design, has already been awarded two U.S. patents.

something more reliable and less expensive."

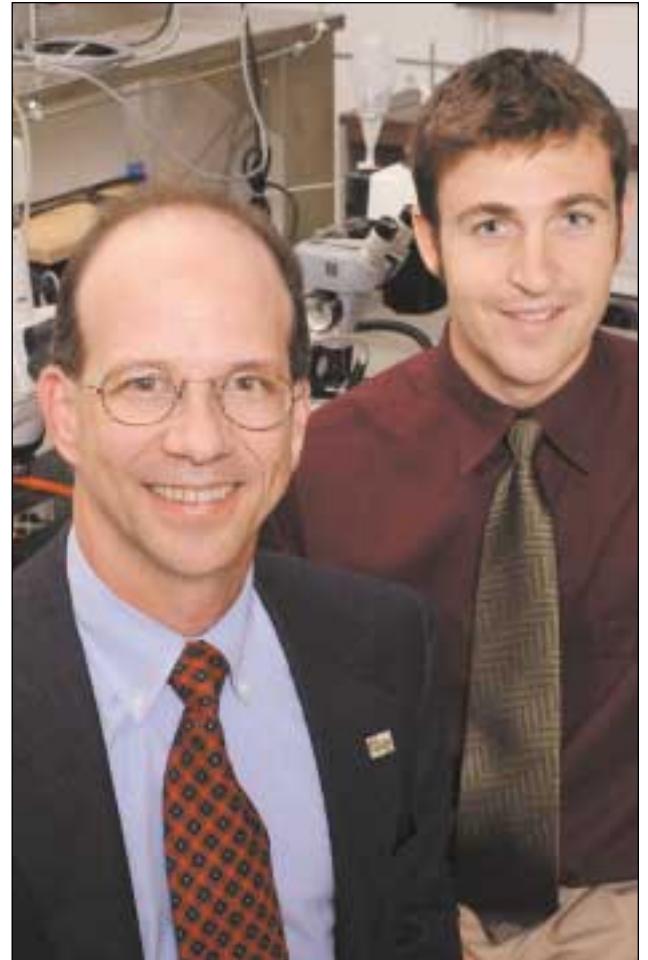
That something is an inexpensive gamma ray detector that for years many scientists deemed too simple to work.

Using the patented design introduced by McGregor, McNeil, a K-State mechanical and nuclear engineering graduate student, simply wrapped Teflon and copper tape around a semiconductor block to improve the resolution of the gamma ray detector—at a fraction of the cost of other techniques.

McNeil built a prototype of the compact, high-resolution device as an undergraduate student during a summer internship at the Brookhaven National Laboratory, in Upton, N.Y., on Long Island. McGregor has since received research funding from the Department of Energy Nuclear Engineering Education Research Program to develop the detector.

The invention received a 2005 R&D 100 Award from *R&D Magazine* for being one of the top 100 most technologically significant products introduced into the marketplace over the past year. The award was presented to the pair and their colleagues—scientists from K-State, Brookhaven, Rojeski Research Engineering, and Yinnel Tech Inc., at a black-tie ceremony in Chicago in October.

—by Keener Tippin II
K-State Media Relations and Marketing



Douglas McGregor and Walter McNeil

Air Transportation Center of Excellence

Federal Aviation Administration personnel, elected officials, Kansas State University administrators, and invited guests met at the K-State Alumni Center in late August for the dedication of the FAA Center of Excellence for Aircraft Cabin Environment Research.

The Air Transportation Center of Excellence was established in the fall of 2004 by the U.S. Department of Transportation's Federal Aviation Administration. Auburn University serves as the lead institution for the center with other members including K-State, Purdue University, Harvard University, Boise State University, the University of California at Berkeley, University of Medicine and Dentistry of New Jersey, and the Lawrence Berkeley National Laboratory.

According to the FAA, the center's task is to develop tools to understand and mitigate environmental issues that concern aircraft occupants, including airliner occupant health issues; development of sensor system technologies to detect contaminants; response methodology for cabin environment incidents; mitigation of air cabin contaminations; and scientific data collection to support regulatory standards.

Heading up research efforts at K-State are Byron Jones, director of the College of Engineering Experiment Station and professor of mechanical and nuclear engineering, along with fellow mechanical and nuclear engineering faculty member Mo Hosni, professor and head of the department.

K-State received an initial \$100,000 in startup funds to initiate its center, as well as an additional \$250,000 for studying the transport of contaminants in the air of aircraft cabins. Substantial additional funding is anticipated. Much of the work will be conducted through the Institute for Environmental Research, housed in Seaton Hall.

In addition to the university members, more than 25 companies and organizations from industry have agreed to partner with the FAA center. The K-State center is currently conducting projects with funding from Boeing and other companies in the aviation industry and will seek to expand such industrial partnerships as future projects are identified.



Richard Hayter, associate dean of engineering for external affairs, back left, and Jon Wefald, Kansas State University president, right, unveil FAA plaque presented at ceremonies Aug. 23. FAA official, Dr. Jon Jordon, federal air surgeon, aerospace medicine, left foreground, looks on.

Clark named head of BioAg department

Gary A. Clark was named department head of biological and agricultural engineering, effective Aug. 21.

Clark joined the College of Engineering faculty at K-State in 1994. Prior to that he had held academic appointments at the University of Florida. He completed both a bachelor's and master's degree at the University of Florida, and a Ph.D. at Texas A&M University, all in agricultural engineering.

Clark is a noted expert in irrigation system design and management, hydraulics of irrigation components, and crop water management. He has published widely, conducted irrigation system design management workshops in the U.S., Mexico, and Egypt, and is a licensed professional engineer in the state of Kansas.

"We are delighted that someone of Dr. Clark's caliber and depth of experience has agreed to lead the department as it moves forward to even greater success," said Terry King, dean of the College of Engineering.

Clark replaces James Koelliker who had served as department head since 1997. He will begin phased retirement with the fall 2005 semester, continuing with teaching and research assignments.



Gary Clark



Liz Townsend

Two added to development staff

Mark Friesen and Liz Townsend have joined the College of Engineering development team, filling the posts of development officer and development coordinator, respectively.

Friesen, a 2002 K-State graduate in business administration, had previously been employed as an account executive with MarketAide Services, Inc., Salina, a marketing communication firm.

Townsend, a 1996 University of Missouri-Colombia graduate in textile and apparel management, came to K-State from the College of Human Environmental Sciences at MU where she had been director of external relations.

They will complete the College of Engineering team led by senior director of development, Mitzi Richards, and Kelly Levi, director of development.



Mark Friesen

News from Alumni

1977

Mark Hutton (CNSM), owner and president of Hutton Construction Corporation, Wichita, had his company named "One of the 30 Best Places to Work" by the *Wichita Business Journal*.

1988

David Todd (ME), project manager for ConocoPhillips, recently completed a project in Ireland culminating in the commissioning and startup of a new ultra-low sulfur diesel hydrotreater at the ConocoPhillips Whitegate Refinery. He and his wife, Suzanne, and daughter, Jessica, will now relocate to Anchorage, Alaska, where David will be managing the capital project portfolio for ConocoPhillips Alaska's oil and gas production activity in the Cook Inlet and Kuparuk River area on the Alaskan North Slope.

1990

Sheila Hayter (ME), P.E. and senior design engineer at the U.S. DOE National Renewable Energy Laboratory, Golden, Colo., was installed as director-at-large for ASHRAE at the society's annual meeting

in June. In this position, she will serve on the ASHRAE Board of Directors and Publishing and Education Council.

1992

Mark Riemann (ME) and **Susan Carrera Riemann** (NE, '93) announce the birth of their first child, Andrew Scott.

1993

Phillip Frazier (ChE) and his wife, Shannon (Vogel) (ElemEd '92), Frisco, Texas, announce the birth of their second child, Hannah Parker, Sept. 13, 2005. Phillip is a senior engineer for Frito Lay.

1994

Bart A. Fisher (EE) has joined the Des Moines, Iowa-based law firm of McKee, Voorhees & Sease, P.L.C., where his practice will focus mainly on patent prosecution and trademark registration. Bart completed an M.S. in business management from Friends University and a J.D. from Washburn University School of Law. He and his wife, Brenda, have a son, Jacob, and a daughter, Rachel.

1996

Cannon Clifton (ChE) graduated from medical school in May 2005 and is now a resident physician in general surgery at the University of Texas Health Science Center at San Antonio. He also passed the exam to become a licensed Texas P.E. in April 2005.

1998

Shirley (Robinson) Walker (CompSci) and her husband, Brandon, Cary, N.C.,

announce the birth of their first child, Susannah Constance, Nov. 14, 2004. Shirley is employed by the SAS Institute.

2001

Jared Madden (ME) and his wife, Kelly (Marketing, '01), Shawnee, Kan., announce the birth of their first child, Claire Elizabeth, May 22, 2005.

2005

Laura Beth Bienhoff (ChE) has been named to a two-year pilot position as the Society of Women Engineers (SWE) Board of Directors Collegiate Representative. She will participate in all board of director activities as a non-voting member and will answer directly to the national president of SWE.

inducted into the K-State Engineering Hall of Fame in 1989. Fairbanks served in the U.S. Army, a veteran of WWII in the South Pacific, from 1941 to his discharge as a captain in 1946. He later served with the U.S. Army Corps of Engineers, retiring as a colonel in 1972. He is survived by his wife, Helen, two sons, two daughters, and 11 grandchildren.

1949

Loren Frederick Casort (CE), Green Valley, Ariz., died June 13, 2004. He is survived by his wife, two children, three grandchildren, and three great-grandchildren. He held an M.S. in aeronautical engineering from USC and during his career worked on bridges, an airplane called the "Guppy," and solid rocket boosters for the space shuttle.

Robert E. Heline (EE), Boulder, Colo., died June 13, 2005. He served in the U.S. Army Air Corps in Europe during WWII and worked for IBM from 1949–1986. He is survived by his wife, Ada.

1975

William "Bill" Frerichs (CE), Savanna, Ill., died March 22, 2005, at the age of 53. He had a 29-year Army civilian career, beginning in 1975 as an intern with the U.S. Army Management Engineering Training Agency and progressing to the position of associate director for logistics engineering with the U.S. Army Defense Ammunition Center. He is survived by his wife, Linda, one son, one step-daughter, and his parents.

Deaths

1937

Clyde McCauley (EE), Westborough, Mass., died July 1, 2005. He was preceded in death by his wife, Macrece, May 1, 2005.

1940

Gustave "Gus" Edmund Fairbanks (AgE, MS '50), Manhattan, Kan., died Oct. 11, 2005. Fairbanks joined the department of agricultural engineering in 1947 as an assistant professor, retiring as a full professor in 1983. He specialized in farm machinery research. He was a licensed professional engineer and was

IER: 40 years of environmental research

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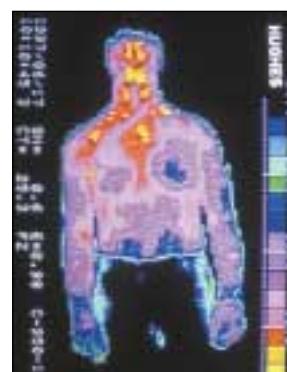
director of the College of Engineering Experiment Station and professor of mechanical and nuclear engineering, along with fellow mechanical and nuclear engineering faculty member Mo Hosni, professor and head of the department.

"Kansas State University was a natural choice to be part of this prestigious team," Jones said. "The Institute for Environmental Research has a track record of more than 40 years of research on enclosed environments and is recognized throughout the world for its pioneering research in this field."

The history

The Institute for Environmental Research at Kansas State University is the only university-based facility of its kind in the nation. Established in 1963 following the gift of a sophisticated environmental chamber from the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, the center occupies 6,500 square feet of laboratory and office space on the K-State campus.

All thermal comfort standards in the U.S. and most developed nations throughout the world today, established by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, come from data



IER thermal image

gathered at the IER at Kansas State University. The Institute for Environmental Research, with a track record of more than 40 years of research on enclosed environments, is recognized throughout the world for its pioneering research in this field.

A large-scale study relating humidity, temperature, and human comfort was conducted in the ASHRAE environmental chamber at the IER, providing the base data for the ASHRAE comfort envelope, which has been and continues to be the building industry's standard, likely has a direct influence on every work site constructed in the U.S. and numerous other countries for more than three decades.

Research at the institute helped establish desirable conditions inside civil defense shelters, psychological effects of being able to adjust an office thermostat, how to properly air condition an automobile, and what indoor temperatures are suitable for the elderly in winter.

Through institute projects, people now know what factors influence the thermal insulation provided by their clothing systems. Thermal ratings have been established for a variety of everyday indoor garments as well cold weather clothing and sleeping bags. Specialty garments such as surgical gowns, and protective gear for firefighters, EMTs, and other high-risk workers have been evaluated at the IER.

Contract research has been conducted at the institute for a number of government agencies including the National Science Foundation, National Institute of Occupational Safety and Health, the Federal Emergency Management Administration, the Federal Aviation Administration, U.S. Army, U.S. Air Force, as well as numerous large and small private companies.

Decade by decade, research at the IER has met the needs of the times—in the 1960s the focus was how to heat and cool all environments, from offices to automobiles; in the 1970s, much research was dedicated to energy conservation, but also included studies with rhesus monkeys and the effects of simulated space orbital changes in day-night cycle shifts; in the 1980s, evaluations began to center on the thermal properties of fabrics and clothing systems.

—by Mary Rankin

Impact

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New 2005 COEAC
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James Johnson,
Paul Malir, and
Cathy Ritter;
front row, left to
right: Brenton
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and Way Kuo.

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