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DEPARTMENT OF MECHANICAL ENGINEERING

Composite Vehicle Research Center: Poised for the Future

Research on composite materials for land, sea, and air vehicles

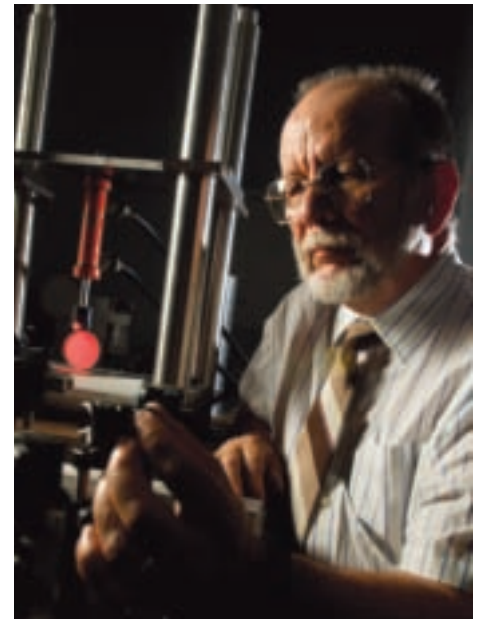
The future is bright for the Composite Vehicle Research Center (CVRC), part of the MSU College of Engineering. Multi-million dollar funding firmly establishes the CVRC and sets the stage for ongoing research on composite materials for vehicles, including those for land, sea, and air applications. "The CVRC is a center of excellence for the design and testing of composite structures for lightweight, environmentally friendly, durable, and safe vehicles with both military and civilian applications," says Eann Patterson, chair of the Department of Mechanical Engineering and currently director of the CVRC.

Gary Cloud, University Distinguished Professor of mechanical engineering, served as the first CVRC director and has worked with the military on composite materials for vehicles for

more than 25 years. For the past 10 years, Cloud and Dahsin Liu, ME professor, have conducted research specifically related to future combat systems with the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC) in Warren, Mich. "Because of previous research, we are able to make immediate contributions," says Cloud.

Researchers are examining problems unique to heavy-duty vehicles, looking for solutions that are applicable to military vehicles of all types. In the process, many of the answers to design questions will have civilian applications. "Military vehicles have not performed well in Iraq," says Cloud. "They were not designed for those combat conditions. Future military vehicles will need to be redesigned and improved. That's the kind of work we can do here at MSU."

In addition to Patterson, Cloud, and Liu,



Gary Cloud served as the first director of the CVRC and has worked with the military on composite materials for vehicles for more than 25 years.



U.S. Senator Carl Levin recently toured the CVRC facility. Here Eann Patterson (right) shows him the thrust areas of the center.

the founding group included Lawrence Drzal, University Distinguished Professor and director of the MSU Composite Materials and Structures Center, and Alfred Loos, ME professor. This past summer three new faculty members joined the ME department and will focus on research at the CVRC. They include Soonsung Hong, assistant professor, who is currently working on nondestructive evaluation and structural health monitoring; Srinivasan Arjun Tekalur, assistant professor, who will focus on biomimetics; and Xinran Xiao, associate professor, who will concentrate her research in structural integrity.

continued on page 2



from the Chair

EANN PATTERSON

In the last four years the department has grown in size with additional faculty being appointed, the construction of the Energy and Automotive Research Laboratories, and a substantial increase in research activity. A major focus over the next few years will be to increase our endowments for graduate students. We are committed to educating undergraduate and graduate students equipped to compete in the global marketplace and who can help rebuild the reputation and economy of Michigan. We are also determined to generate new knowledge and novel technologies that will benefit society both globally and locally in Michigan. A strong educational program and a thriving research program both have high-quality faculty as a prerequisite and we need a plentiful supply of good graduate students to attract and retain the best faculty.

Graduate students support faculty in their teaching duties and, more importantly, work in their research labs developing novel ideas and generating the data required to validate new theories and demonstrate innovative technologies. On completion of their PhD, the majority of our graduate students enter the labor force as the driving energy behind the research and development of innovative products and services. The raising of the average educational level of the workforce through a greater proportion of PhD graduates will be essential for Michigan and the U. S. to compete globally in a knowledge-based economy. Recently a few donors have recognized this need and given generously to the department. However, the growth in the department over the last few years means that we need to increase our Endowed Graduate Fellowships ten-fold if we are to sustain our efforts to "Advance Knowledge and Transform Lives."

During the summer we took a number of significant steps in our strategy to strengthen the research profile of the department. In August, three new tenure-track faculty joined the department (see page 4). They are based in the Composite Vehicle Research Center (CVRC) on Alliance Drive along with Professors Loos, Liu, and Cloud. This firmly establishes the CVRC as our newest facility in the department. While we have not yet had a formal opening, U. S. Senator Carl Levin was welcomed to the CVRC by the dean and the provost in October and, with the press, toured the facility.

Our next center is already emerging. Patrick Kwon, associate professor, has successfully established an NSF Industry/University Collaborative Research Center (I/UCRC) in Advanced Cutting Tool Technology. In addition, Viktor Astakhov joined the department as a research professor, and I hope he will be the first of many. He is one of the world's leading experts in machining metals and so will be a major asset to our rapidly developing manufacturing research. He will be featured in a future issue of the department newsletter.

Education remains fundamental to our mission and an area in which we continue to strive to excel. Some evidence of our success is provided by the triumph of our student design team in the ASME International Student Design Competition (page 6). It is our second victory in recent times. We remain committed to continued improvement of our programs and during the summer we appointed two additional teaching specialists. Laura Genik is featured on page 4, and Scott Kieffer will join us in January 2009 from Trine University where he is an associate professor of mechanical engineering. 🌱

CVRC (continued)

Gaetano Restivo, visiting assistant professor, is currently the assistant director of the CVRC and oversees day-to-day management of the center and conducts research on fastening of composites.

What is unique about MSU's CVRC is the emphasis on composite vehicles and vehicle components. "No other center nationwide is directly involved with composite vehicle systems and system integration," says Cloud. "TARDEC is a system integrator concerned mainly with vehicles." Cloud points out that composite vehicles are mandated for a mobile army and the marines. "The development of these types of vehicles is lagging in a time of increased threat." New design paradigms will be necessary to meet performance criteria and to contain costs. "The Army needs armored, light-weight, long-life vehicles," says Cloud. "This agreement is timely because of the need to replace lost and worn-out vehicles from Iraq. Eventually there should be benefits to the automotive industry in the production of lighter weight vehicles using newly developed composite structures with improved crashworthiness."

One reason that MSU is on the cutting edge of the development of composite vehicles is the long-held emphasis on design validated by experiment. Analytical, numerical, and experimental approaches are utilized. "A lot of recent design work has been based only on mathematical modeling and simulation. There is little experimentation and testing," says Cloud. "MSU has unique expertise to combine both analytical and experimental approaches." In fact, with good reason, verification and validation by joint use of analysis and experimentation is being mandated. Health monitoring, smart structures, and self-repairing structures that involve sensing and data processing are increasingly important. The basic research is applicable to a range



Professor Alfred Loos (right) explains ongoing research to U.S. Senator Carl Levin (center) and Eann Patterson.



The home of the Composite Vehicle Research Center (CVRC).

of vehicles including ones used in the air and on the seas, in addition to land vehicles.

Another key in getting this funding is the dissemination of results. “We have to let others know what we are doing and share the results,”

says Cloud. “The knowledge gained through our research has to be transferred to sponsors, industry, and the scientific community. As a land-grant university we are good at sharing knowledge.”

Cloud believes in the future of CVRC “We fully expect to be a permanent center that can eventually generate its own funding and does not have to rely on federal earmark funding.” 🌱

– Jane L. DePriest

What is CVRC?

The Composite Vehicle Research Center (CVRC) designs and tests composite structures for light-weight, environmentally friendly, durable, and safe vehicles. The center is part of the MSU College of Engineering. The CVRC’s guiding principle is “Design Validated by Experiment.” The Center’s activities have three dimensions.

- Creativity – world-class research leading to new design concepts
- Innovation – engineering application of results
- Dissemination – knowledge transfer to sponsors, industry, and the scientific community

What are the goals of the Center?

- Advanced design of composite shells and structures for vehicles
- Novel experimental mechanics methods and smart sensing systems for analysis, nondestructive evaluation (NDE), and structural health monitoring
- Integration of simulation and experimental mechanics in design protocols for vehicles

What are the thrust areas?

Impact resistance – Resistance of the vehicle and its occupants to crash, impacts, and fire.

Composite joining – Design and reliability of efficient joints in composite structures. “Military vehicles may need to be bolted together quickly on the ground. Making these composite joints so they are tolerant of difficult service environments is a tough problem,” says Gary Cloud, University Distinguished Professor, who has specialized in this area.

Multifunctional composites – Design, fabrication, and integration of

new composite materials that have mechanical, thermal, electrical, and self-healing properties at low cost. Research in this area also includes using nanotechnology in composite products.

Self-diagnostic composite structures – This includes the development of embedded devices for NDE and structural health monitoring.

Structural integrity of composites – Evaluation and prediction of fatigue life and durability of vehicles in highly stressed service over long periods.

Biomimetics – Exploration of designs in nature to create efficient structures. “This is a new area,” says Cloud. “If I were just starting out, I would work in this area. Nature has some of the most ingenious designs.” For example, a turtle’s shell is a composite and it is self-healing.

Manufacturing – This is a newly added thrust area that deals with whether the materials or vehicles can be made and how to make them.

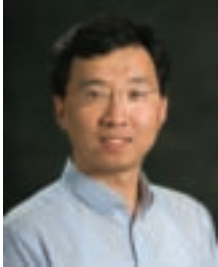
Why MSU as the location for the CVRC?

- Federal collaborating agency is already in place
- Long-established research relationship with the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC) in Warren, Mich.; also fundamental research that is designed to respond to TARDEC needs, as well as prolific production of scientific research papers
- Large international concentration of expertise in experimental mechanics
- Composite Materials and Structures Center already established
- Premier land-grant university 🌱

Faculty and Staff @ ME

New Faculty

The Department of Mechanical Engineering welcomes three new faculty members this fall. They are all members of the Composite Vehicle Center (CVRC).



Soonsung Hong, assistant professor, earned his PhD ('03) in solid mechanics from Brown University. Hong is currently working on nondestructive evaluation and structural health monitoring in an effort to develop self-diagnostic composite structures for air and ground vehicles. He is also interested in investigating fracture and failure of heterogeneous materials and structures by using full-field diagnostic tools coupled with inverse problems in solid mechanics.



Srinivasan Arjun Tekalur, assistant professor, earned his PhD ('07) in mechanical engineering and applied mechanics from the University of Rhode Island. Tekalur's research

will focus on the biomimetics of composite materials. His broad research interests are composites, mechanics of materials, and dynamic deformation and failure.



Xinran Xiao, associate professor, earned her PhD ('87) in applied sciences from the Free University of Brussels. She will concentrate her research in structural integrity thrust. Xiao

worked at General Motors from 1999-2008. She was a faculty member from 1992-1999 at Concordia University, Montreal, Canada.

Academic Specialist

Laura J. Genik joined the department as a visiting faculty member in January 2007 and has recently accepted a full-time teaching position as an academic specialist. Genik spent a number



of years as a faculty member in the School of Engineering at the University of Portland in Portland, Ore., and most recently returns to MSU via Wayne State University where she

has been teaching since 2005. Genik holds a BS, MS, and PhD in mechanical engineering from Michigan State University. Genik teaches a broad range of undergraduate courses in mechanical engineering and graduate courses in the thermal fluid sciences. Her research emphasis is in engineering education and pedagogy.

New Graduate Advisor



Brian Feeny, associate professor, has taken on the oversight of the ME graduate student program, including admissions, advising, and a special focus on recruitment of top gradu-

ate students. He received his BS, MS, and PhD in mechanics from the University of Wisconsin – Madison ('84), the Virginia Polytechnic Institute and State University ('86), and Cornell University ('90), respectively, and then held a postdoctoral position at the Institute of Robotics ETH in Zurich, Switzerland. He joined the MSU ME faculty in 1992. In addition to his role as graduate advisor, Feeny is currently secretary of the Technical Committee on Vibration and Sound for the ASME, and serves as an associate editor for the *ASME Journal of Vibration and Acoustics*. His research interests are in dynamics and vibration with current activities in nonlinear dynamics, chaos, proper orthogonal decomposition, friction dynamics, and system identification.

Carroll Smith Mentor's Cup

Gary Cloud, University Distinguished Professor in mechanical engineering, won the prestigious Sports Car Club of America (SCCA) Carroll Smith Mentor's Cup for the most dedicated team advisor in Formula SAE. Since he began advising the Formula SAE Teams, Cloud has served as a



constant resource to aid in transitioning teams from year to year, and supports the vision that the team should be led by students, making it an educational endeavor in all aspects. The award

presentation was made by SCCA and the Society of Automotive Engineers in May 2008.

Young Investigator Award



Tonghun Lee, assistant professor, has been selected to receive a grant from the Air Force Office of Scientific Research (AFOSR) Young Investigators Research Program (YIP) for his work in laser

diagnostics of plasma-assisted combustion for scramjet applications. He is one of 39 researchers selected nationally for an award, which he will receive over a three-year period.

YIP fosters creative basic research in science and engineering with the goal of enhancing the early career development of young investigators and increasing opportunities for them to recognize the Air Force mission and related challenges in science and engineering. The AFOSR will award approximately \$12.1 million total in grants through this program.

Executive Leadership Academy



Eann Patterson, professor and chair of the ME department, has been selected by the MSU Office of the Provost as one of 12 fellows for the 2008-09 Executive Leadership Academy (ELA).

These fellows are in current leadership roles across the university. The Executive Leadership Academy is a learning opportunity that includes an in-residence Leadership Development Program, follow-up coaching, monthly discussions, and on-campus leadership seminars.

Former Faculty Joins NSF

John McGrath, former ME faculty member, has joined the National Science Foundation (NSF). McGrath, who for the last several years has been department head of aerospace and mechanical engineering at the University of Arizona, will be on loan to the NSF for three to four years and will serve as the division director of Chemical, Bioengineering, Environmental and Transport Systems (CBET). This division includes engineering, water and sustainability, multi-scale modeling, nano-scale science and engineering, and integration of life science with engineering.

NSF Diversity Research

Tamara Reid-Bush, visiting assistant professor, is part of the Advancing Diversity through Alignment of Policies and Practices (ADAPP) research that is supported by a \$3.98 million grant from the National Science Foundation.



This is an Institutional Transformation grant that is part of a nationwide NSF effort involving 38 other universities to increase the representation and advancement of women in academic science and engineering careers. Initially, the project includes the Colleges of Engineering, Natural Science, and Social Science. However, project activities will bridge multiple campus resources and will be expanded to the entire university community. MSU Provost Kim Wilcox is the PI for the project. Reid-Bush joins five others as part of the research team. Team members will work to implement new practices during faculty recruitment and promotion, reappointment, and tenure processes. 🌱

Mahlon C. Smith, ME professor emeritus, age 80, died May 30, 2008. He retired from MSU in 1998 after 30 years. Smith was born in Friendship, Wisc., on December 15, 1927. He served in the U.S. Army and Coast Guard during WWII. Smith loved hunting, fishing, airplanes, and military history; but his family was always first. Surviving are his wife, Geraldine (Miller) Smith; daughter, Elizabeth (Michael) Brown of Marshall, Mich.; three sons, Cooper (Tristan) of Milford, Mich., Shawn (Traci) of Cleveland, Ohio, and Padraic Smith of Haslett; 4 grandchildren; 2 brothers, Neal (Ann) and Lewis Smith; and 2 sisters, Nola Smith and Loraine Smith. 🌱

ME Professor Invents Energy-Efficient, Low-Cost Air Conditioner



Norbert Müller, assistant professor in the Department of Mechanical Engineering, and John S. Barrie, of the Appropriate Technology Collaborative in Ann Arbor, Mich., have won the Boston Innovation Prize for the design

of a low-cost, energy-efficient method of cooling and dehumidifying residential and small commercial spaces. "The technology used for this air conditioner is radically different," says Müller. "We are using the most natural refrigerant, water." He is, of course, happy about the award and sees it in the broader context of his research to reduce energy consumption and as an acknowledgment of the progress that has been made.

This Innovation Prize was developed by The Barr Foundation, a private family foundation committed to enhancing the quality of life for citizens in the Boston area, and the Cambridge Energy Alliance (CES), an organization that seeks to reduce the carbon footprint of Cambridge, Mass., in the next five years. It was posted on InnoCentive's Web site. InnoCentive is a global Web community enabling scientists, engineers, profes-

sionals, and entrepreneurs to collaborate on breakthrough solutions. Müller and Barrie were awarded \$30,000 for the cooling technology, which they submitted as part of the contest. It was one of 38 submissions reviewed by a panel of national experts. "We looked at a number of impressive designs, but this one really stood out because of its potential to consume significantly less energy and reduce peak demand compared to standard air conditioners," says Kendra Tupper, a member of the panel of judges and a senior consultant at the Rocky Mountain Institute.

The air conditioner uses water vapor as the refrigerant. When water vapor is used this



This is one of the first woven turbo wheels with an integrated induction motor that spins up to 6000 rpm.

way, it is referred to as R-718. Water vapor can be more efficient than traditional refrigerants, but engineering the compressor is difficult and expensive. In Europe where there are high energy costs, water vapor is used as a refrigerant in large projects. The economics of making a smaller scale R-718 compressor have, in the past, proven to be prohibitive. Müller invented a way to make an economical compressor that is small and lightweight by designing a novel turbo compressor woven out of high-strength fibers with an integrated motor. "It gives wonderful control. It's efficient and compact," says Müller, who points out that up to 30 percent of U.S. electricity is used for cooling and air conditioning. Another plus for the new R718 technology is that by experience it is surprisingly quiet.

Barrie is an architect and industrial designer. He and Müller have teamed up for other grant proposals. "I work to develop and promote innovative sustainable technologies," says Barrie. "My contribution to this project is as a consultant on how air conditioning functions in the real world." Müller and Barrie want to develop prototypes of the air conditioner as additional funding for development becomes available. 🌱

— Jane L. DePriest

Students @ ME

NASA Fellowship



Elliott J. Radcliffe, a mechanical engineering graduate assistant, recently received a prestigious fellowship from the NASA Graduate Student Researchers Program (GSRP). He

was selected based on an application he made to the Langley Research Center in Hampton, Va. A primary component of the application is a five-page research proposal, which is reviewed for quality and relevance to NASA research. The title of his proposal is "Concept Evaluation of an Optical Feedback Controlled Microphone for Aeroacoustics Research."

The goal of NASA's GSRP is to cultivate research ties to the academic community to help meet the continuing needs of the nation's aeronautics and space workforce. The idea is to increase the number of highly trained scientists and engineers in aeronautics and space-related disciplines. Radcliffe's fellowship is effective through August 15, 2009, with a possible renewal for the 2009-2010 academic year. Since being accepted for the fellowship, Radcliffe has been performing research in the Flow Physics and Control Laboratory under the direction of his adviser, Ahmed Naguib, ME associate professor. Radcliffe is the son of Clark and Arlene Radcliffe of Okemos. His father is a professor in the Department of Mechanical Engineering.

International Student Design Competition

The Design Program in the ME department continues to set a standard for excellence in winning the International Student Design Competition of the American Society of Mechanical Engineers. The event was held during the ASME International Congress and Exposition held in Boston early in November. Competing against teams from Carnegie-Mellon University, Hong Kong Polytechnic University, Colorado State University, and others, the MSU team wiped the competition clean with their window cleaning robot, Winboni.

The team included **Emily Duszynski, Kyle Koepf, Jonathan Luckhardt, and Joshua Thomet**. The group designed and built an autonomous robot that attaches itself to the window with a suction fan, moves across the

ME 2008 Distinguished Alumni Award



Daniel J. Inman (PhD '80, Mechanical Engineering) received the 2008 Mechanical Engineering Distinguished Alumni Award at the annual College of Engineering Alumni Awards Banquet in May. Established in 2004, this award honors an alumnus of MSU's Department of Mechanical Engineering who has more than 15 years' engineering experience, shows leadership, contributes to the department, the college, or the university, and is actively involved in the community.

Inman is the director of the Center for Intelligent Material Systems and Structures and the G. R. Goodson Professor in the Department of Mechanical Engineering at Virginia Polytechnic Institute and State University (Virginia Tech). A prolific writer, Inman has published eight books, eight software manuals, and many papers. Inman is currently technical editor of the *Journal of Intelligent Material Systems and Structures* and the journal *Shock and Vibration*. He is a fellow of the American Academy of Mechanics (AAM), the American Society of Mechanical Engineers (ASME), the International Institute of Acoustics and Vibration (IIAV), the American Institute of Aeronautics and Astronautics (AIAA), and the National Institute of Aerospace (NIA). Always a leader in his profession, Inman is a founding member of the ASME Adaptive Structures and Material Systems Technical Committee and the AIAA Adaptive Structures Technical Committee. In 2007, Inman received the ASME Den Hartog Award for lifetime achievement in teaching and research in vibration.

Inman earned his BS in physics at Grand Valley State College (1970). While teaching high school physics in Grand Rapids, Mich., he earned an MAT in physics from MSU (1975). He then enrolled full-time as a PhD student in physics. However, through his acquaintance with Robert ("Bob") Little, then chair of MSU's mechanical engineering department, he was persuaded to switch to mechanical engineering. After completing his PhD, Inman became an assistant professor at the University of Buffalo, where he became an NSF Residential Young Investigator in 1984. By 1992, when he joined Virginia Tech, he had risen to the position of department chair at the University of Buffalo. Virginia Tech hired him as their Samuel Herrick Endowed Professor and as director of their Mechanical Systems Laboratory. Since 1998, Inman has been the G.R. Goodson Endowed Professor and director of the Center for Intelligent Material Systems and Structures. He holds a patent in smart structures on self-sensing actuation and has three pending patents.

Inman was a single parent while working on his PhD. His daughters have fond memories of MSU, especially of visiting the farms. Inman once managed to get three tickets to watch Magic Johnson play basketball; but his daughters were so terrified by the noise, they had to leave just ten minutes into the game. Jennifer (Scamacca) is now a part-time teacher, and Angela (Petri) does Web-based marketing. Dan met his wife, Cathy (Bob Little's daughter), at MSU. She is a 1978 graduate of the College of Human Ecology. Their son, Daniel, is a mechanical engineering freshman at Virginia Tech. 🌟

window with powered wheels, and scrubs the window clean with a felt pad. MSU ME teams have won this event twice, making MSU the first two-time design champion. The team was coached by Andrew Siefert, ME master's student. Professor Clark Radcliffe served as the team's mechatronics consultant.



The team that designed and built an autonomous robot that cleans windows included from left: Kyle Koepf, Emily Duszynski, Jonathan Luckhardt, and Joshua Thomet.

Spartan Engineers. Built Better.

Ross Weaver, a mechanical engineering junior, is also a cornerback on the winning MSU football team. He is one of several engineering student athletes who are featured in ads, developed by the College of Engineering, that appear in MSU sports programs. The theme of the ads is "Spartan Engineers. Built Better." The idea is to show parents, future students, alumni, and others that engineering students can balance academics, internships, grad school, and sports. Weaver's ad is featured at right. Weaver, who is from Southfield, Mich., hopes to get an engineering internship and enjoys doing hands-on design. He is the son of Ross Weaver Sr. and Tonya Weaver. 🌿

Spartan Engineers. Built Better.

"I'm doing a lot of hands-on design, working with a team to figure out creative solutions for our projects. My next step is an internship and I know I'm prepared."

Ross Allen Weaver
Junior, Mechanical Engineering
and MSU Cornerback

At MSU we're building engineers for the future. What sets our engineers apart is an immersive process called Spartan engineering, which combines intensive classroom study and research with challenging real-world experiences tailored to meet each student's needs and interests. There are engineers, and then there are Spartan Engineers.

MICHIGAN STATE UNIVERSITY

Discover the difference at

2008 Claud R. Erickson Distinguished Alumnus Award



Charles Brady (right) with Ron Rosenberg, associate dean.

Charles J. Brady (BS '48) received the 2008 Claud R. Erickson Distinguished Alumnus Award at the annual College of Engineering Alumni Awards Banquet in May. Dean Lawrence Wayne Von Tersch established this award in 1982. Claud Erickson, for whom the award was named, was the first recipient.

Since then, it has been given annually to a College of Engineering graduate with more than 15 years' professional experience who has attained the highest level of professional accomplishment;

provided distinguished and meritorious service to the College of Engineering and the engineering profession; and engaged in voluntary service at the local, state, national, and/or international level.

Brady spent his entire career at General Motors as a prolific scientist and engineer. His inventiveness and creativity were evident from the beginning at GM. During the early years, he helped design and develop test instruments for use during proving ground tests.

In 1985, the Society of Automotive Engineers elected him as a fellow in recognition of his Tire Performance Criteria, which set the standards for converting from bias to radial tires. Brady developed the first specifications that tied together vehicle performance and the tire, which improved both safety and fuel efficiency. In 1987, the General Technical Committee at GM honored Brady for his contributions to automotive safety and testing. Brady

was also instrumental in developing GM's desert proving grounds in Mesa, Ariz., as well as in modernizing the proving grounds in Milford, Mich., such that Milford is now GM's most technically advanced proving ground.

Brady was promoted to vice president in 1984 and has been credited with catalyzing the movement within GM to focus on customer needs instead of relying on the principle that the corporation knows best. Brady was always open to innovative programs to promote diversity in hiring. He appointed the first African American director of the proving ground in Mesa. He also authorized the funding of summer living quarters for minority engineering college students from historically black colleges so they would have an opportunity to work as interns and be able to compete for GM engineering positions upon graduation.

As an MSU alumnus, Brady represents the best of Spartan traditions. He has tirelessly championed MSU and is unflagging in his support. He was a member of the College of Engineering Alumni Association Board from 1973 to 1977, serving as chairman for two years. He and his wife, Mary Kay, generously donated time and money to MSU, becoming members of the John A. Hannah Society. They were regular attendees at football games, president's brunches, and alumni gatherings. Mary Kay passed away in 2007 after 59 years of marriage.

Brady lives in Brighton, Mich., with a seasonal home in Naples, Fla., and a summer home at Torch Lake in Michigan. He has a son, Robert, of Muskegon, Mich., and two daughters, Kathy Flippo of Connecticut and Lynn Strong of Brighton. 🌿

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Homecoming Tailgate – October 4, 2008



Edwin Choi (BS '02 mechanical engineering) enjoys the Homecoming festivities.



April Noren (BS '07 computer science) with her father, Lawrence J. Noren III (BS '81 mechanical engineering).

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