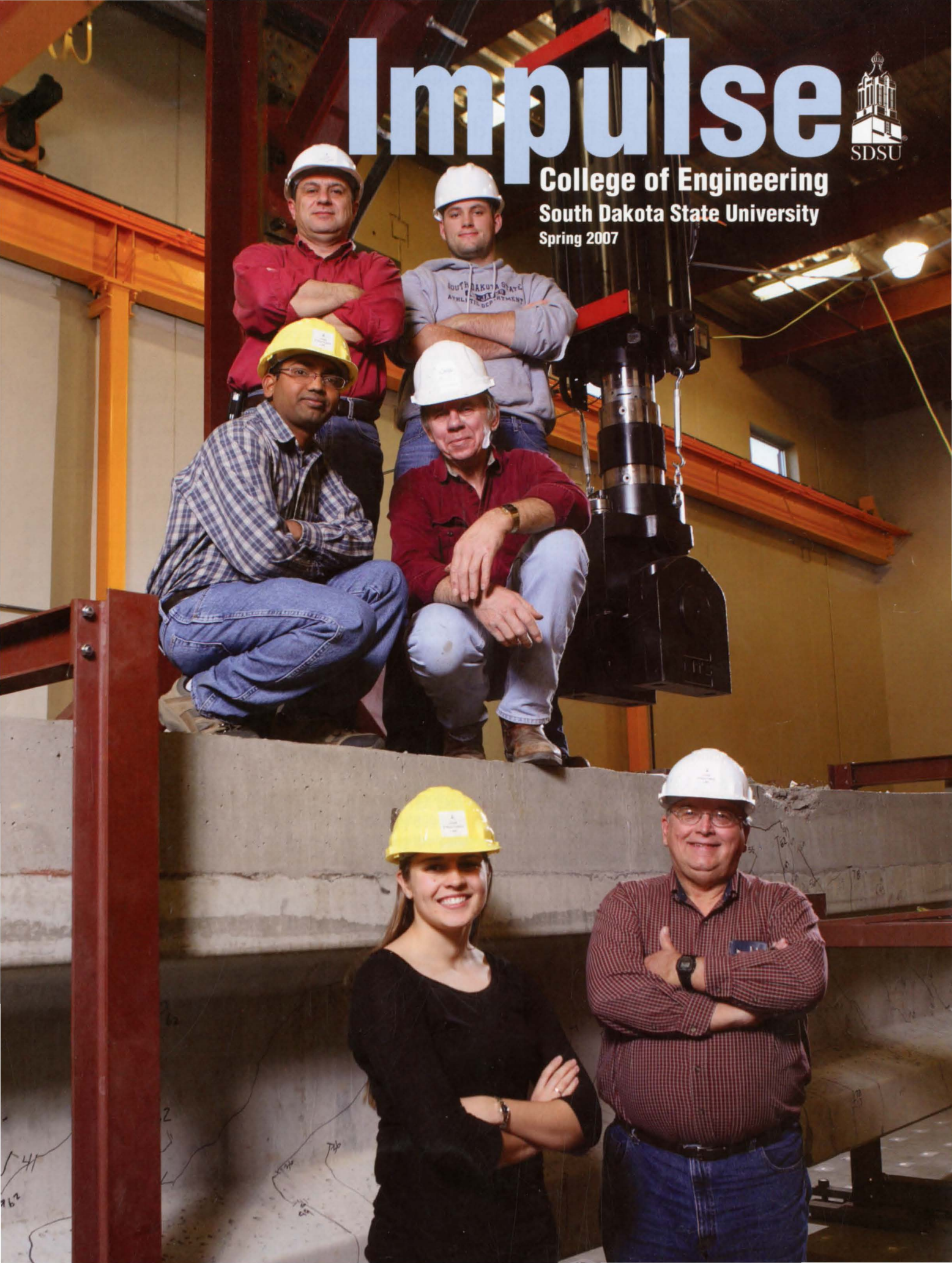


Impulse



College of Engineering
South Dakota State University
Spring 2007





Dear alumni and friends:

As this *Impulse* reaches you, we have just completed another great and historic year for SDSU and the College of Engineering! This issue will show you why 2006-2007 has been an exceptional year for our students and faculty.

By the time you receive this issue, we will have already dedicated the J. Lohr Structures Laboratory with the March 15 ribbon-cutting event. Our first article will give you an appreciation for the scale of structural research now being conducted in the facility. These outstanding facilities now support important transportation structures research being conducted by faculty in our Civil Engineering and Environmental Department.

You will also read about the involvement of our mechanical engineering faculty in the important research area of biofuels and bioprocessing. This collaborative research with faculty from the College of Agriculture & Biological Sciences is of great economic importance to South Dakota and our nation.

You may have heard about the great efforts in South Dakota to convert the former Homestake Mine in Lead to the National Science Foundation-funded Deep Underground Science & Engineering Laboratory (DUSEL). This issue will shed some light on the DUSEL project and our efforts to be involved in deep underground research.

A key part of our mission is outreach, and this issue will highlight some of the many technical conferences we host, including the new Leadership and Product Development Conference.

Summer camps are a wonderful way to reach out to young people and encourage them to consider future careers in science, technology, engineering, and mathematics. Please read this feature story and recommend one or more of our youth camps to your children or those of friends. These are an outstanding experience. More information is also available on our College of Engineering Web page.

You may recall an article a few years ago about our Native American outreach partnership with the Flandreau Indian School. This issue will provide an update on our Success Academy program and the generous support of Citibank and Citigroup.

Of course, this *Impulse* features many articles on our students—read about some of their personal accomplishments as well as some of the fascinating industry-sponsored senior design projects they worked on this year.

This is the annual issue where we highlight our donors, as you can see from the impressive list. I want to thank all of you for your generosity and encourage your continued support. If you are not already a member of our Dean's Club, please consider becoming one and helping us continue to produce the best graduates in mathematics, engineering, science, and technology.

As someone has so accurately stated, we have gone from a "state-funded" university to a "state-assisted" university, depending more and more on the private funding from our friends and the external funding from our research and outreach activities. Your financial support is part of the lifeblood of the College of Engineering.

I hope you enjoy this latest issue and will drop us a line or stop in for a visit if you're in our area. Remember, Jackrabbits are always welcome!

Lewis Brown, Ph.D.
Dean of Engineering

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From left, Kim Button, Stephanie Herseht, and Becky Schmieding all helped make the first Ready, SET, You-Go-Girl seminar a success in October 2006.

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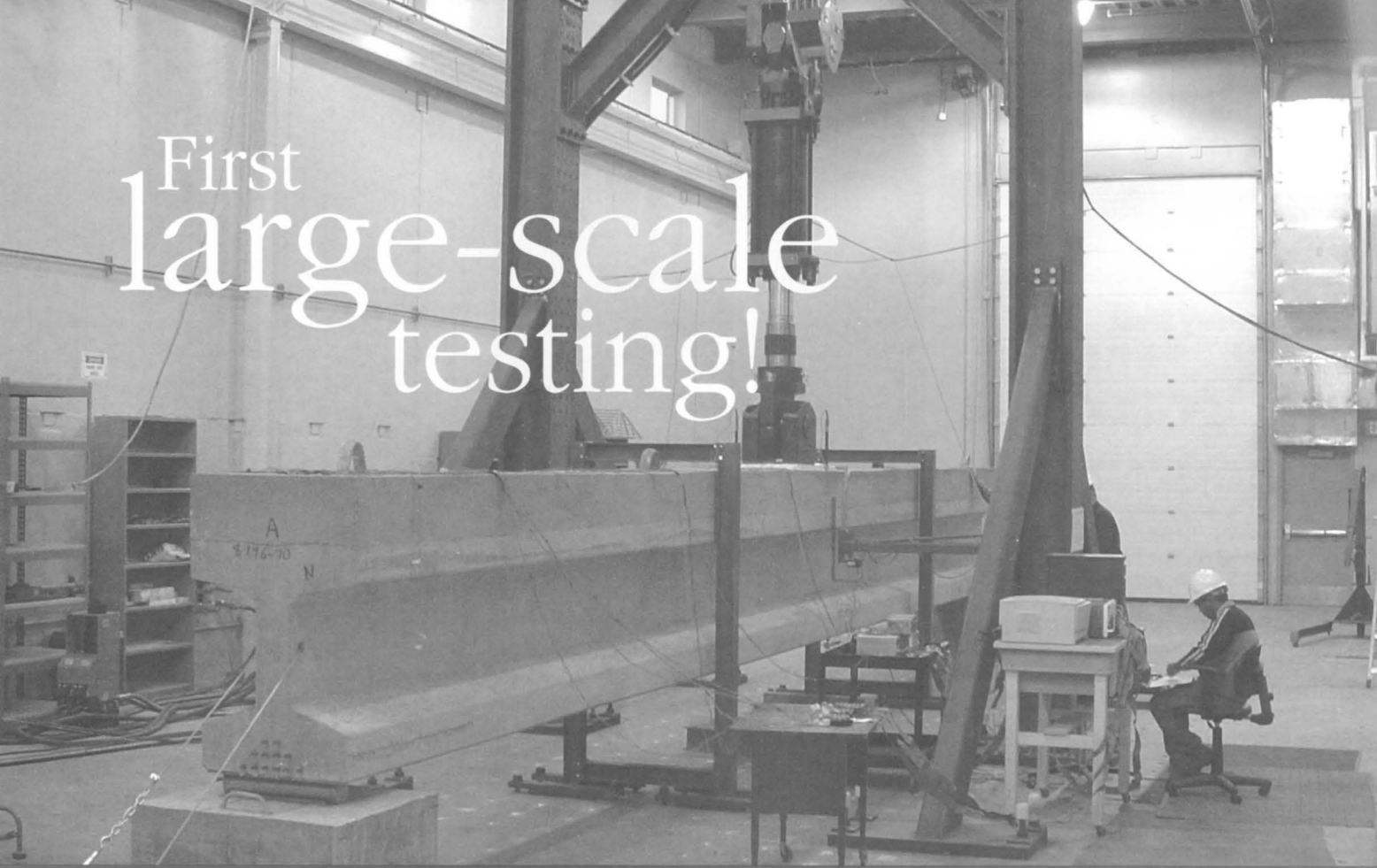
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These six conducted the first full testing at the Jerome Lohr Structures Lab October 25, 2006. Pictured, from left to right, top to bottom: Associate Professor Nadim Wehbe, grad student Jason Zemlicka, instrumentation engineer Sri Pasikanti, technician Jim Anderson, grad student Amanda Boushek, and Professor Arden Sigl. See story on **Page 2**.

Cover photo by Eric Landwehr.

First large-scale testing!



'Historic day' for Jerome Lohr Structures Laboratory

It's not every day when semi-tractor trailers back into your garage to deliver eighteen-ton packages.

That's what occurred in August 2006 at the Jerome Lohr Structures Laboratory, the only facility of its kind in South Dakota and unique in the upper Midwest for testing large structural pieces of material for strength and endurance.

The lab measures twenty-eight feet high, thirty-nine feet wide, and ninety feet long. It features a giant overhead crane and a twenty-four-foot door clearance.

Two months later, October 25, was a memorable occasion for the lab because on that day the first bridge girder was tested. It marked the first full-scale testing of a massive structure, and the lab passed with flying colors.

"We truly believe that history was made that day at the College of Engineering," beams Nadim Wehbe, associate professor and coordinator of the structures lab. "We've tested smaller items before with good success. However, what this test represents is the first testing of a structure of this magnitude and it was very successful."

The structures lab was officially unveiled at a ribbon-cutting ceremony March 15. Engineering faculty from the College and dignitaries from around the state were present.

Lohr: will bring research

The structures lab is the largest and most visible component of a 24,000-square-foot addition built onto the southeast corner of Crothers Engineering Hall that was dedicated in fall 2002.

Three years ago the facility was outfitted with a hydraulic structural testing system, a modular loading steel frame, a post-tensioning system, and load cells. The cost was \$400,304, of which \$280,213 came from the National Science Foundation through a competitive proposal and the remainder from SDSU.

The lab was named after Raymond native Jerry Lohr, a 1958 civil engineering graduate of the College and major fundraiser for the addition.

"I've always known we had very good faculty," says Lohr, who is president and owner of J. Lohr Vineyards & Wines in California. "They just needed the space

and some equipment to get started. To my knowledge there is not another facility like the structures lab within 500 miles.

"The laboratory will allow faculty to demonstrate full-scale challenges to students and will enable undergraduates to get a feel for the scale of full-size beams and other items," adds Lohr. "It will allow graduate students to do research on full-scale projects, and it should help South Dakota and the region build infrastructure for the prosperity that is to come to the area."

Testing strength of concrete

Bridge girder testing has been the focus of a collaborative research project involving the College, South Dakota Department of Transportation, two precast concrete producers in South Dakota (Gage Brothers in Sioux Falls, Cretex in Rapid City), and the Mountain Plains Consortium (see separate story on MPC).

"We are very pleased that SDSU is conducting research on self-consolidating concrete bridge girders," says Dave Huft, director of research with the S.D. Department of Transportation. "The work

is applicable, not only to bridge girders, but other structures as well such as box culverts and bridge abutments that are heavily reinforced with steel.”

The project called for testing three full-scale prestressed bridge girders made in Sioux Falls from aggregates in eastern South Dakota. One was made with regular mix and the other two with self-consolidating concrete.

The girders were furnished almost “free of charge” by the concrete manufacturers, partly because “it is in the interest of the local producers to see that this technology will be used by both the Department of Transportation and local industry,” Wehbe remarks.

Load of 251,000 pounds

Using the lab’s largest hydraulic actuator suspended from the giant loading frame, the actuator applied an initial rate of about 5,000 pounds of load for every 100th of an inch that it advanced downward on each girder.

The control girder and one of the self-consolidating concrete girders, each forty feet long and four feet deep, were tested for strength under an increasing load. Each girder began showing cracks at 140,000 pounds of load. They did not completely fail or break until the load capacity reached 251,000 pounds—some 80,000 pounds away from the actuator’s total capacity.

The girders were instrumented with an array of sensors that measured load, deflection, and strain values throughout the test, which took between four to six hours to complete, notes Wehbe.

“After each load increment, we stop the actuator, collect data, and inspect the girder for cracking,” he says. “The entire testing can be a very slow process.”

The outcome matched the desired results, according to Wehbe, who indicates the self-consolidating concrete girder behaved exactly like the one made with traditional concrete.

“That’s what we wanted to show, that self-consolidating concrete is every bit as good and strong as regular concrete,” he says. “It’s even better because you have a higher quality finished surface with less labor.”

Huft observes the use of self-consolidating concrete will make it easier to ensure that no voids exist within the girders.

“While conventional concrete sometimes has difficulty flowing among

the prestressed strands, the self-consolidating concrete flows far more freely, reducing the risk of defective girders,” he says.

The third girder is the subject of an on-going test that calls for the specimen to undergo fatigue loading, which simulates the passage of trucks over a bridge.

Aging the girder

Like its two relatives, the girder has a ten-inch deep regular concrete slab riding atop the self-consolidating concrete-made girder. The slab represents a bridge deck, and bearing down on the slab is the actuator, which is exerting a million-and-a-half cycles of load at different stress ranges.

“We are aging the girder within a relatively short period of time which will tell us a good deal about the durability of bridge girders made with self-consolidating concrete,” points out Wehbe. “The actuator keeps applying load after load about every second.

“Fatigue loading takes time,” he adds. “This portion of the test will take a couple of months. The actuator will run ten hours every day at a loading frequency of one cycle per second.”

The next phase of the project will take place in late spring or early summer. Two more bridge girders will be made in Rapid City using aggregate from the Black Hills area. They will be shipped to the structures lab for testing.

“We want to make sure that self-consolidating concrete works whether it is made here or in western South Dakota,” remarks Wehbe.

Testing under cover

Considering the tonnage of the girders, plus the fact that testing at this scale had never been conducted before in the structures lab, Wehbe and his team were understandably apprehensive.

Besides the actual testing, the scientists also wanted to test the system and the integrity of the loading frame itself.

The first girder was put in place and “massaged” with the actuator applying a load of 100,000 pounds at small increments of 5,000 pounds.

“We didn’t want to fail the girder the first time, even though it was way below the girder’s capacity,” says Wehbe. “When we gained confidence that we had good



TOP: The girder arrives on a flatbed.
BOTTOM: A girder right after failure.

control over the testing equipment, the real testing came another day.”

That momentous day was October 25 and it happened at night, not because it was criminal, but for safety reasons.

“We didn’t want anything to go wrong when there are people around,” he says. “Although the system was designed to take the loads, a person still doesn’t know how it will react until the first full-scale test.”

Project benefits all parties

From small testing of structures materials, to large-scale items like bridge girders, the Lohr Structures Lab has come full circle.

“We are now in a position where we can confidently test a full range of specimens, from small ones to very large structures,” says Wehbe. “This lab not only serves the needs of local industry, but it’s a tremendous resource for hands-on research by our faculty and graduate students.”

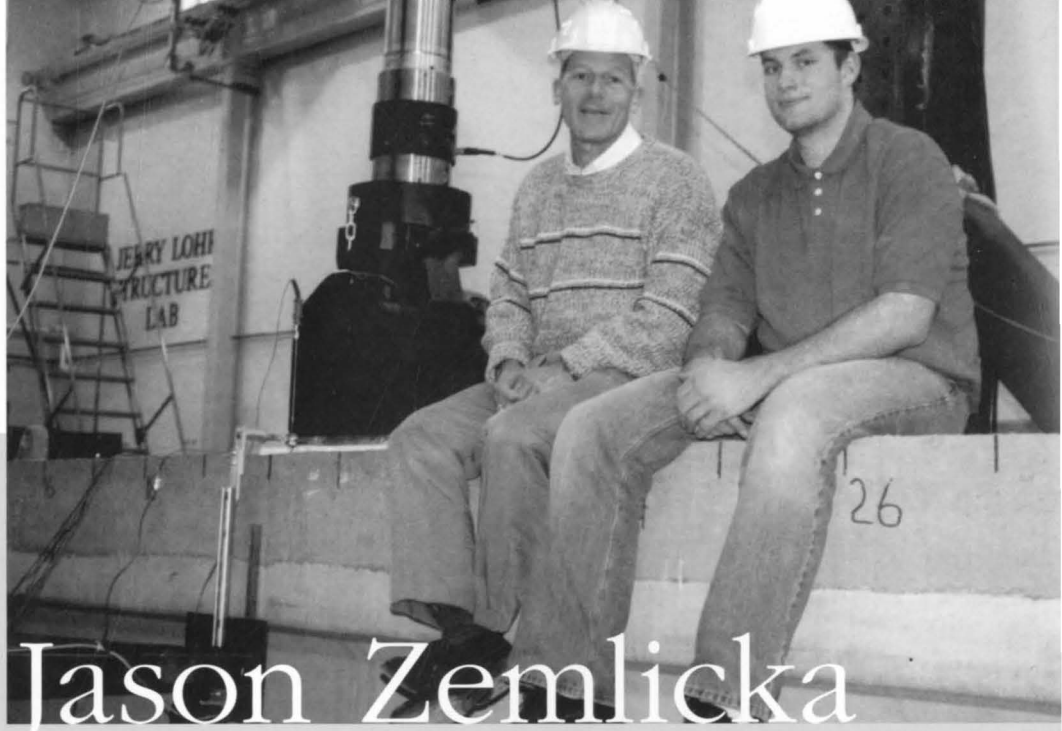
The bridge girder project promises to produce both economic and educational benefits, according to Huft.

For Wehbe, who has been at SDSU for nine years, Jerome Lohr Structures Laboratory is the pinnacle of his career.

“I’m very proud of it,” he says, when talking about the lab’s capabilities. “There is no other facility like this in South Dakota. We truly believe that October 25 was a historic day.”

"At the time I thought Jason would be a good engineering student. It's always great to meet students when they are in high school, see them progress through college, and go on to their careers."

– Assistant Dean Rich Reid on graduate student Jason Zemlicka.



Jason Zemlicka

From city road crew to civil engineering grad student, girder project culminates Zemlicka's schooling

For more than a year the office inside the Jerome Lohr Structures Laboratory has been like a second home for Jason Zemlicka.

The Miller native will graduate in May owning a master's degree in engineering with an emphasis in structural engineering.

He has been collecting a vast amount of data and measurements for his thesis, which is a good thing, because the large volume of data is appropriate for the massive specimens he is studying: forty-foot long prestressed concrete bridge girders that cross the scales at eighteen tons apiece.

"It's kind of crazy," he says. "I never saw myself doing this, ever."

Zemlicka, who earned his bachelor's degree in civil engineering in December 2005, is conducting research under the supervision of Associate Professor Nadim Wehbe and Professor Arden Sigl, both of the Department of Civil and Environmental Engineering.

The current research study, and an expected add-on that will start July 2007, are co-funded by the College, the South Dakota Department of Transportation, the Mountain Plains Consortium, and two precast concrete producers in South

Dakota (Gage Brothers in Sioux Falls and Cretex in Rapid City).

An influential summer

In summer 2001, Zemlicka got his first real taste of what civil engineers do while working for a city crew that was installing geotextile, a new fabric used for strengthening roads.

On one particular day, the assistant dean of the College and professor of civil engineering, Rich Reid, arrived to provide technical advice to city engineers concerning the construction. During a break, Zemlicka mentioned he had enrolled at SDSU as a general engineering student. However, once September rolled around, the incoming freshman was a certified civil engineering major.

"We had a chance to discuss engineering and how the type of work we were doing was related to civil engineering," recalls Reid. "Our conversation may have helped him to decide what type of engineering to major in.

"At the time I thought Jason would be a good engineering student," he adds. "It's always great to meet students when they are in high school, see them progress

through college, and go on to their careers."

Responsible for design scheme

Zemlicka's research project is testing the structural performance and strength of a new breed of bridge girders made with self-consolidating concrete.

Self-consolidating concrete is self-flowing, meaning no mechanical vibration devices are needed to make it fill spaces. It is relatively new in South Dakota and is not being used in the construction of highway bridges due to insufficient data regarding its structural performance.

Two bridge girders have been tested, one with regular concrete and one with self-consolidating concrete. With a hydraulic actuator applying downward load from a giant loading frame, the girders behaved in a similar fashion, both failing at 251,000 pounds.

Zemlicka's role is much more than simply analyzing data. He was the one who designed the girders in the first place, an impressive revelation from the quiet and soft-spoken future engineer.

"I designed them and did all the instrumentation," he says modestly. "Professor Wehbe approached me about the project and gave me the dimensions the girders needed to be."

A third girder made of self-consolidating concrete rests outside his office. With several hundred feet of wires attached to it, Zemlicka is gathering stress load and deformation data while the girder undergoes fatigue loading, a simulation which has the actuator applying cyclic loading, much like passing trucks do every day on a bridge.

Will head to Montana

Zemlicka has been at the girders' side since the beginning, even spending most of a "hot, dry, and windy" July overseeing their construction at Gage Brothers fabrication facility. His presence was

needed to make sure all the sensors and gauges were appropriately positioned before the concrete was poured. Once embedded, the sensors give off electric signals that Zemlicka converts to engineering measurements.

Was designing the girders a big responsibility? "Quite a bit, yes," he admits. "It was quite a process, but well worth it, too."

When Zemlicka steps off the graduation stage in May, he will head to Billings, Montana, and begin working for the engineering firm of Cushing, Terrell and Associates.

"I'm looking forward to it," he says. "I'm glad that I decided to pursue civil

engineering as my career field. I feel fortunate to have been taught by some outstanding professors and work on research projects such as this one for my thesis."

Kyle Johnson

OPPOSITE : Assistant Dean and Professor Rich Reid, left, and graduate student Jason Zemlicka sit on an eighteen-ton bridge girder, which was the subject of a test that called for the specimen to undergo fatigue loading to simulate the passage of trucks over a bridge. Zemlicka, whose master's thesis was on bridge girder testing, met Reid in Miller when Zemlicka was helping the city crew with a road construction project during the summer of his senior year in high school, and Reid was there to provide technical instruction.

Mountain Plains Consortium

a 'big plus' for research, study

When it comes to rating organizations, the Mountain Plains Consortium ranks high on the list.

The Department of Civil and Environmental Engineering and SDSU certainly are reaping the rewards ever since becoming the fifth member admitted to the elite fraternity July 1, 2006, joining North Dakota State University, University of Wyoming, Colorado State University, and the University of Utah.

"There are many benefits to be gained," says Nadim Wehbe, associate professor of civil engineering and director of the Mountain Plains Consortium at SDSU. "Being a member brings in tremendous financial resources to conduct cutting-edge research."

The consortium is one of ten regional university transportation centers in the United States and Puerto Rico that were created by the U.S. Department of Transportation in 1988.

Major initiatives for members

The consortium receives federal funding for some noteworthy initiatives, enabling members to: conduct research in transportation-related topics, offer and develop courses on campus and through the Transportation Learning Network, and train future American generations to design, manage, and maintain the country's transportation infrastructure.

"There is a great need for trained engineers to handle the future demands of

the transportation system in the U.S.," notes Wehbe. "That is why the U.S. Department of Transportation is funding such an effort."

SDSU's admittance to the consortium was due largely to the Jerome Lohr Structures Laboratory. The only facility of its kind in South Dakota and in many states, the lab is a spacious facility that can be used to test large structural elements and systems.

"When we prepared our proposal to become a member of the consortium we had to show what we could offer in the area of transportation research," reports Wehbe. "Having the structures lab was a major plus in getting us admitted to the consortium."

From July 1, 2006, through June 30, 2007, the consortium provided SDSU with \$85,000. Funding will increase every year, until it reaches \$200,000 in 2010, at which point the consortium must resubmit a proposal for additional federal funding when Congress writes a new transportation bill. All federal monies received must be matched, either by the College or from nonfederal sources.

Research projects underway

The consortium and the South Dakota Department of Transportation are cofunding three projects the first year.

One is the structural application of self-consolidating concrete. The second one, which is in conjunction with SDSU's Department of Horticulture and Forestry,

is studying the effect of chloride injury from deicing salts on trees along state highways in the Black Hills. The third project is evaluating how to combat the problem of scour erosion at bridge pier sites in the state.

Wehbe has completed one nonresearch project in the first year of membership. He used funds to outfit the Bartlett and West Engineers Resource Room as a video-conferencing facility for conducting activities of the Transportation Learning Network.

With large monitors and high-tech video-conferencing equipment, consortium members and regional departments of transportation can conduct meetings, offer courses to students at other member schools, and provide training to department of transportation engineers and technicians.

Wehbe indicates that during the spring semester graduate students in civil engineering will be taking courses from the University of Utah and Colorado State.

Kyle Johnson



Nadim Wehbe

"Being a member brings in tremendous financial resources to conduct cutting-edge research that will benefit the region."

– Associate Professor
Nadim Wehbe.

Economic Evaluation of Integrating Biodiesel Production with a Dry Mill Ethanol Plant

Steven Bly, James Julson, Mike Twest
South Dakota State University, Dept. of Agricultural and Biosystems Engineering, Dept. of Mechanical Engineering

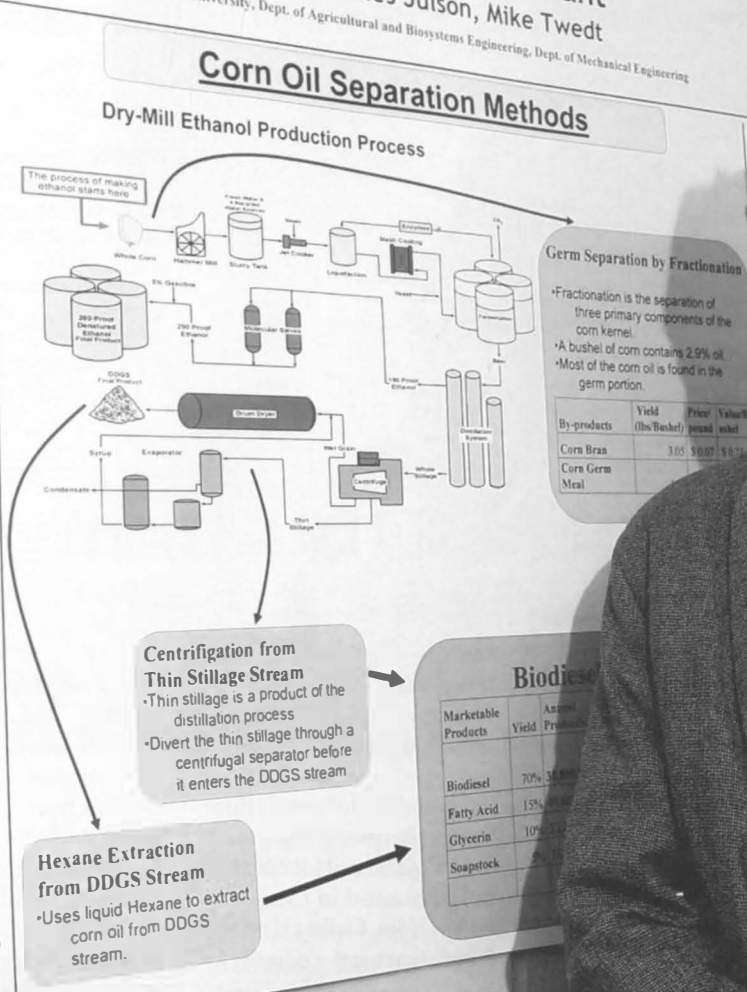
Background:
Current national ethanol production capacity of 4 billion gallons annually. National biodiesel production capacity is expected to reach 1.15 billion gallons by Dec 2007 (3x current cap). Soybean oil is the current primary feed stock for biodiesel production. This study evaluated the use of corn oil as a feed stock for biodiesel production.

Research Method:
The following methods for corn oil separation were economically evaluated:

1. Fractionation for germ separation and subsequent oil extraction from the germ.
2. Extraction of oil from the thin stillage stream by use of a centrifuge.
3. Hexane extraction from the dried distiller's grain with solubles (DDGS) stream.

A 30 million gallon/yr biodiesel production facility was used to evaluate the feasibility of each oil separation method.

This research project was funded by the Joseph F. Nelson Mentorship and the Griffith Student Research Award.



Turning grass into gas

Mechanical engineers help in researching new energy source

"From a mechanical engineering standpoint, what systems and processes are needed? How efficient the energy being used? What is being wasted and what can be recycled? These are the questions being looked into for this research project."

— Don Froehlich, head of the Mechanical Engineering Department

Finding new sources of energy is an appropriate endeavor for a land-grant university. The assignment fits quite nicely in the triad mission of teaching, extension, and research. An enhancement of that mission is the Sun Grant Initiative, a U.S. Department of Transportation sponsored program that has land-grant universities broadening their roles beyond traditional agricultural issues. The Sun Grant Initiative seeks to develop new biobased energy technologies. Specifically, research dedicated to making ethanol from

biomass materials other than corn and soybeans. The initiative is made up of five regional land-grant universities: SDSU, Oregon State University, Oklahoma State University, University of Tennessee-Knoxville, and Cornell University. SDSU is the lead institution for the North Central Region that covers a ten-state area. Fueled with \$720,000 from the Sun Grant Initiative, SDSU is in the early stages of a four-year research program to assess the potential of prairie cordgrass as a biofuels' source and developing conversion systems to make it happen.

Many partners involved
The research is a multidisciplinary affair involving several campus departments, including Mechanical Engineering, Agricultural and Biosystems Engineering, Biology and Microbiology, Chemistry, and Plant Science. "The objectives of the team are very important for this whole effort tied to creating efficient procedures and means to obtain ethanol from biological materials," says Mechanical Engineering Department Head Don Froehlich. "Ethanol development is an extremely important

topic as the national mandate to become less reliant on petroleum increases.”

Froehlich adds that other sources of biofuels are being looked at because, “We are only going to have a certain volume of corn to go around,” he says. “There are many other uses for corn.”

A corn shortage is a distinct possibility, according to Mechanical Engineering Professor Alex Moutsoglou. “The industry knows that eventually corn can’t stand by itself, there must be other sources,” he says. “People are now looking at other alternatives like grass.”

The team’s project director is Bill Gibbons, a professor in the Biology and Microbiology Department. He says the work is important to South Dakota because the Great Plains is considered the “carbohydrate capital” of the world.

“Our soils and climate create a very productive ecosystem for plant biomass, and by processing that biomass to fuels and chemicals, we can reduce or eliminate the need for petroleum-derived products,” says Gibbons, who indicates that South Dakota is already reaching the point of producing more ethanol than what the state consumes in gasoline.

“We will soon become an energy exporter,” he predicts. “This has all been accomplished by just processing a portion of our corn grain. If we can develop technologies to process biomass, we will be able to increase this production by several fold.”

Rewarding work

The wide scope of the research touches many interests, especially for scientists born and raised in South Dakota like Mike Twedt, instructor in mechanical engineering and a key player in bioprocessing research grants.

A Mitchell native with strong ties to farming relatives, Twedt’s core passion has been energy conversion, energy conservation, and energy cost reduction. His role is focused on systems analysis, systems engineering, and economic feasibility analysis related to plant development and biochemical processing efforts.

He says his background meshes well with the Sun Grant Initiative because it focuses on reducing the nation’s dependency on foreign energy.

“Seeing the significant potential for our state’s economic development, and the benefits to our ag-based businesses and farms as a result of the research, is personally gratifying,” he says. “I also find it enjoyable to work with a wide disciplinary team that I normally would not collaborate with.”

Agricultural producers are pleased, too, according to Froehlich. “They will have more use for the products they grow and the possibilities of growing other crops,” he says.

Gibbons says the team will initially collect naturally occurring prairie cord grass samples from around the state to establish a seed bank and conduct field observations.

“The strains with the best production characteristics will start a breeding program to improve production and composition,” he says. “I would imagine most of this work will be on plots around the SDSU campus, but then as different varieties are developed, they will be tested throughout the state to assess their performance on different soils and under different climatic conditions.”

Agriculture, with its traditional role of providing food, feed, and fiber, now has the task of producing feedstock plants such as prairie cord grass into a viable ethanol source.

“This country uses 140 billion gallons of fuel every year,” Froehlich says. “We want to get to a point where we can produce twelve to fifteen billion gallons from our crops. That’s the ultimate goal.”

Fuel from grass: the process

Corn fuels most of the ethanol plants in the United States today, but tomorrow’s plants may rely on nonedible crops.

But biofuels is broader than field corn. Scientists at SDSU are studying the possibilities of prairie cord grass because it represents a plant resource that can produce more biomass per acre than other native plants, according to Gibbons.

“It has a longer growing season and seems to be more tolerant of poor soil quality,” he says. “If our work with prairie cord grass is successful, it could become another biomass-type crop.”

Gibbons explains if the project is successful and prairie cord grass is found to be a sustainable biomass resource, it

would lead to a breeding program to create even more productive strains.

“Researchers in our processing group are working to develop pretreatment and hydrolysis methods to release fermentable sugars from biomass,” he says. “The work will evaluate conversion of prairie cord grass as well as other feedstocks like corn stover, switchgrass, and big blue stem grass.”

Deriving ethanol from plants such as prairie cord grass involves both the engineering and microbiology fields.

What is . . .

Biomass conversion: Biomass conversion is any process that transforms plant material into other products. Two conversion processes are being investigated: biochemical and thermochemical.

Biochemical conversion: Biochemical conversion uses physical and chemical pretreatments to open the physical structure of a biomass. Enzymes are then added to cleave the polymers (cellulose) into fermentable sugars, according to Gibbons, who notes the process itself “is mild as it tries to gently tear apart the biomass, yet keep the sugars intact.”

Thermochemical conversion: Thermochemical conversion uses high temperatures and pressures to rip apart biomass into one- and two-carbon molecules. Catalytic processes are then used to recombine them into larger molecules.

“Heat breaks down the components of a living matter,” says Froehlich. “From a mechanical engineering standpoint, what systems and processes are needed? How efficient is the energy being used? What is being wasted and what can be recycled? These are the questions being looked into for this research project.”

Kyle Johnson

OPPOSITE: Mechanical Engineering Professor Alex Moutsoglou stands by a chart that explains the bioprocessing of ethanol. He is part of a campus multidisciplinary team for the project *Developing a Prairie Biorefinery* that will utilize prairie cord grass as a feedstock. The project is for four years and is sponsored by the Sun Grant Initiative.



Weapons research

SDSU, partners developing fatigue odometer sensor

The University is one of five research partners working to better track wear and tear on military vehicles and weapons, thereby being more cost effective and improving safety for soldiers in the field.

“Our goal is to acquire the nondestructive testing equipment needed to evaluate the degree of and the rate of deterioration of a pressurized cylinder due to repeated usage, such as that of a barrel through which ammunition has been propelled,” says Fereidoon Delfanian, professor of mechanical engineering and principal investigator of the project for SDSU.

“Our personnel then must learn how to properly operate this equipment so we can perform tests to evaluate the amount of wear and tear that has occurred to the part.

“This will then tell us how much usable life of the component remains so it is not replaced prematurely. This can then save both time and money and increase the factor of safety for the individuals operating the machinery,” he says.

Sensor instead of paper

Delfanian says the military now uses pen and paper to keep track of equipment usage, including the number of shots fired. But paper can easily get lost.

“The Department of Defense wants the partners to develop an on-board sensor system that will automatically keep accurate usage records for both vehicles and weapons, so it can reliably predict when a failure might occur and prevent it,” Delfanian says.

“Other teams are researching new electronic devices that will serve this need. Overall, the partners have three years to develop a deliverable device.

“Though the technology will be designed for military use, it has wide-ranging possibilities for application to many types of equipment and individual moving parts. When it is proven that it can function as intended, it can be mass produced, and we are hoping the project will generate more jobs in South Dakota,” the professor says.

Work is currently in the concept stage, with all five partners bringing their ideas to the table.

The partners

The five partners are:

- SDSU;
- Batcheller Consulting Group, Sioux Falls;
- Army Benet Laboratories, Albany, New York;
- Augusta Systems, a West Virginia-based company which has opened offices at the South Dakota Technology Business Center in Sioux Falls;
- The American Science and Technology Corporation, which has a six-office branch at the Enterprise Institute on campus.

Keeping all five entities connected involves cohesive communication. Delfanian holds a weekly meeting with his SDSU constituents. Every two weeks, SDSU meets with the American Science and Technology Corporation. Every month, all five partners meet via teleconference.

The funding

A \$1.65-million Department of Defense grant, which was awarded September 30, 2006, is funding the three-year project. SDSU’s first-year share of the grant is \$468,000, which pays for people and equipment. The SDSU research team consists of four graduate students and three faculty members who work on the project full time during the summer: Delfanian as principal investigator, Zhong Hu from Mechanical Engineering, and Huitian Lu from Engineering Technology and Management.

Several teams of engineering students are also involved in the research as part of their senior design projects. The American Science and Technology Corporation has also hired four people, a majority of whom are from South Dakota.

Funding has already been earmarked for the second year, which begins October 1, when SDSU will receive \$342,000.

“We hope to get the third year approved,” Delfanian says. “If we’ve accomplished our task, they might further fund us.

The possibilities

“If we get the money to buy more equipment, we will be capable of doing more research, testing, and educational work here,” Delfanian says. “We hope to one day have equipment for a nondestructive evaluation lab. We’d like to become the center for the whole state of South Dakota in terms of this technology.”

Delfanian credits Senator Tim Johnson, chair of the Senate Appropriations Committee, for backing



the project. Representative Stephanie Herseth also supported the funding. Their efforts led to the passage of the bill that contained the fatigue sensor project.

“They saw the potential in terms of technology and benefit to South Dakota,” Delfanian says, “and they had the clout to get it through.”

A key connection

SDSU became involved due to Delfanian’s long-time association with Ali Manesh, chief executive officer of the American Science and Technology (AST) Corporation.

“Dr. Manesh is a good friend and colleague,” Delfanian says. “The idea came from AST. He was gracious enough to call me, and I was willing to work with him.”

The two worked together for three years to gain federal funding, working closely with the Office of Research and Sponsored Programs. In addition, to acquaint the people from the other entities with SDSU and what it had to offer in terms of expertise and facilities, representatives from Benet Laboratory, Augusta Systems, Batcheller Consulting, and AST visited the campus last spring.

These technical personnel saw the potential for development at SDSU with the expansion of the engineering building and the reputation that the University brings to the research arena.

“The right person came at the right time and we seized the opportunity,” Delfanian says. “Our congressional people supported us as they saw potential benefit to the state and its workforce and industries, as well as to the region and the nation. The coordinated effort of all these

people resulted in SDSU getting this important research project.

“This project has the potential to benefit the people of South Dakota as well as SDSU, the College of Engineering, the Mechanical Engineering Department, and the Manufacturing Engineering Technology Department. When you have the funds, you can recruit graduate

students and provide them a valuable learning experience within the program.

“This opens the door for us to do more innovative things in the future. Faculty members are looking forward to that.”

Cindy Rickeman

College seeks highest degree in mechanical engineering

A doctorate in mechanical engineering?

The proposal is currently in the hands of the South Dakota State Legislature, and if the word is “Go,” the news couldn’t be better for the College and agricultural producers in the state.

It would begin in the fiscal year following legislative approval.

A Ph.D. in mechanical engineering would give the College four doctoral programs, joining electrical engineering, computational science and statistics, and geospatial science and engineering.

“Getting a doctorate in mechanical engineering would open up many opportunities of research and funding for the faculty,” says Professor Alex Moutsoglou.

The mechanical engineering doctorate would carry with it an emphasis in biofuels and thermochemical processing. It comes at a time when the College is engaging in a four-year research project assessing the potential of prairie cord grass and other feedstock plants as an ethanol fuel source.

Graduates of the new Ph.D. program would possess advanced knowledge in bioprocessing and biofuels production. They would also be equipped with the expertise to lead industries in developing new technologies for converting alternative feedstock to biofuels and energy.

The program would initially produce five to six graduates annually with more in the future, according to Mechanical Engineering Department Head Don Froehlich, who indicates undergraduate enrollment continues to climb with about 300 students this year.

In addition, three new faculty positions would be created along with several graduate assistants.

“We have excellent faculty who provide the necessary instruction and advising for our undergraduate students,” says Froehlich. “However, if we’re going to expand and continue to have more involvement for our faculty in the areas of scholarly activity and research, an avenue to do that is a Ph.D. in mechanical engineering.”

Mine Homestake

SDSU has deep hopes for underground science lab in Black Hills

The University has a keen interest in the proposed underground science and engineering lab at Homestake Mine, and has submitted several experimental projects for consideration.

"It would be scientifically unique for the state," says Physics Assistant Professor Robert McTaggart. "We don't have any other big research labs going here."

The state is currently awaiting word from the National Science Foundation on whether it will choose Homestake as the site for an underground lab.

Competing with Homestake for NSF designation are Henderson Mine in Colorado, Cascades in Washington State, and the Soudan Mine in Minnesota. Of the four, only Homestake and Henderson were awarded NSF planning money. McTaggart says South Dakota did everything it could toward winning NSF approval.

"Given the state's resources, there isn't much more the state could have done to position themselves in the selection process," he says. "The governor's been very supportive. The state's done a tremendous job in doing all the legal work, getting the title of the land, working with the previous owners, allocating state funds.

"The state is aware that there's no particular guarantee, but they've done everything they can to ensure Homestake is a possibility."

Cutting edge physics research

A Homestake Interim Laboratory is planned at the 4,850-foot level, a move that would bring cutting-edge physics research to the gold mine at Lead in the Black Hills that was shut down in 2002.

In anticipation of the opening of the interim lab, the South Dakota Science and Technology Authority solicited letters of interest from the scientific community, which were submitted at a meeting at Homestake in February 2006. McTaggart gave several presentations at the meeting and submitted two letters outlining scientific experiments that could be done at Homestake.

"The one in the foreground deals with the concept of a low level, background counting facility," McTaggart says. "We would assay various materials brought into the mine for radioimpurities."

"Health Physics at Homestake Mine" proposes to look at what happens to various organisms, such as cancer cells, when placed in regions of low levels of radiation.

Economic impact

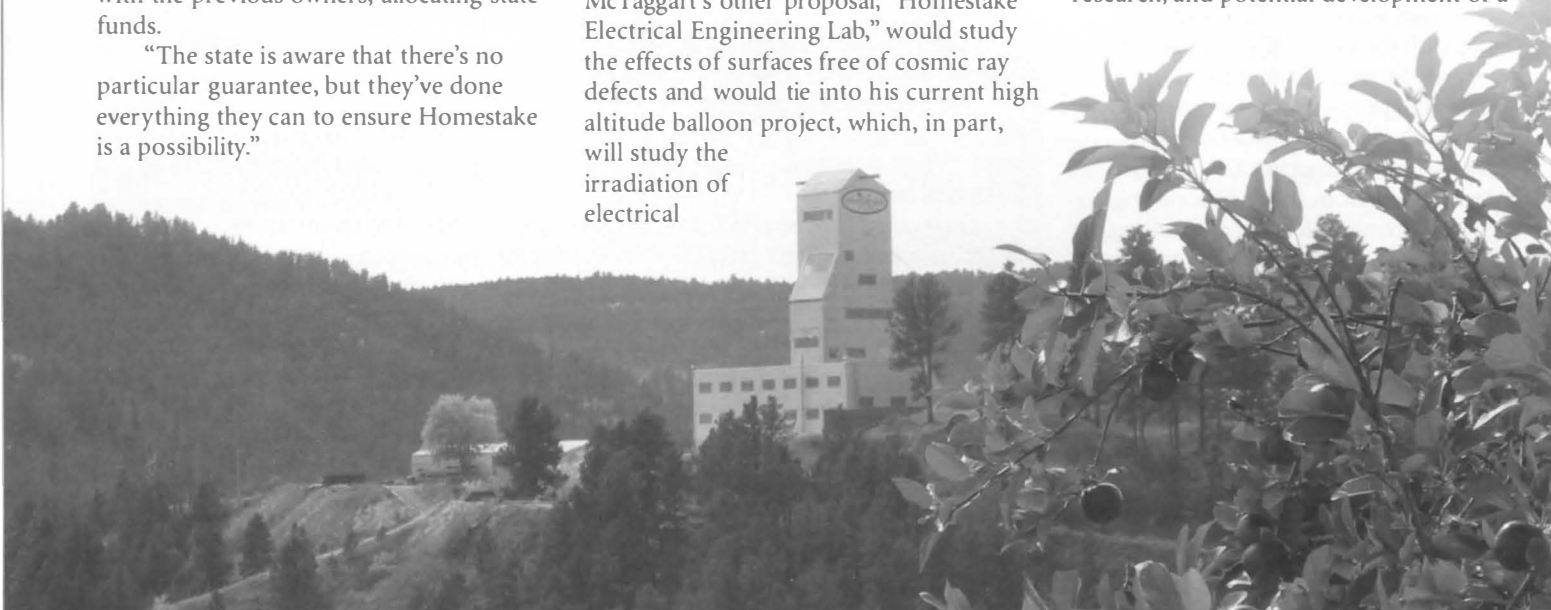
McTaggart's other proposal, "Homestake Electrical Engineering Lab," would study the effects of surfaces free of cosmic ray defects and would tie into his current high altitude balloon project, which, in part, will study the irradiation of electrical

components in balloons released from the Stratobowl near Rapid City.

"If you're looking for industrial or economic impact, that's a good venue for it," McTaggart says. "Of course, it's unproven whether there's an advantage to making semiconductors in a cosmic ray free environment, but you don't know until you do it. Infrastructure would need to be built before we could do this."

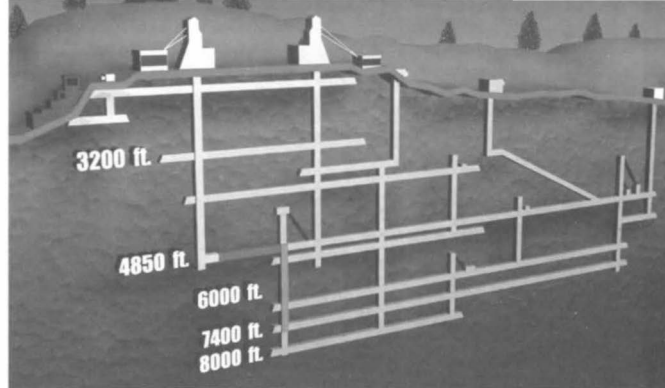
All of these proposals would require collaboration with other researchers both at SDSU and elsewhere, McTaggart explains. As with a lot of research, it's unclear what financial impact these proposals will have directly in the short term. However, they would enhance the research portfolio of the Physics Department and allow SDSU faculty and students to interact with scientists on the frontier of their respective disciplines.

In the long term, McTaggart says, an underground lab at Homestake will benefit SDSU via an increase in the number of students wanting to study physics, engineering, biology, and chemistry; economic development and/or federal funds resulting directly or indirectly from future Homestake research; and potential development of a



OPPOSITE : While the apple tree continues to bear fruit, the Ross Headframe at the Homestake Mine at Lead is idle. However, the 131-year-old mine may find new life as a scientific lab. That option hinges on a decision the National Science Foundation is expected to make in May or June.

RIGHT: A cutaway schematic of tunnels at the Homestake Mine at Lead show the depth of various tunnels. The state is looking to develop an interim lab at a depth of 4,850 feet. Since its closure, water has risen to the 5,600-foot level.



doctoral degree in physics and enhancement of current doctoral degrees already on campus.

Deep, dark mysteries

An underground lab brings opportunities found nowhere else.

“An attractive feature of Homestake is that the rock shields sensors from cosmic rays,” McTaggart explains. “Other opportunities involve microbes that exist deep underground without sunlight; they feed off geothermal energy instead of sunlight.

“They’re an ancient form of life, thought to be the first microbes to exist on earth, and they live under extreme heat and pressure,” she says. “Scientists would study the geologic structure of the rock and the chemistry of the rock and how microbes interact with it.

“The NSF has been looking for an emphasis in the study of biodiversity. That fits like a glove.”

Other experiments perfect for the underground lab involve neutrinos, dark matter, and a possible new energy source.

“The rock provides shielding from cosmic rays,” McTaggart says. “The deeper you go, the more shielding. But neutrinos, which are very light particles, go through rock like butter. The challenge is detecting rare neutrino interactions when they do occur.

“Neutrinos are produced in nuclear reactions, in the sun when fusion occurs. Neutrinos can offer a better insight into what is happening directly in the sun’s core than the sun’s light does, right now. We hope to learn how fusion can be performed on Earth as another energy source. We already have an example that works, 93.7 million miles away.

“A group is studying the possibility of neutrinos coming from the Earth’s core, the so-called geo-neutrino experiment. It may explain how the Earth produces its magnetic field.”

A boon to the state

The Homestake lab itself would be a magnet for students and instructors of physics, McTaggart says.

“There’s a concern with a reduction in high school graduation rates,” he says. “Homestake can play a part in attracting students from out of state and from in state. It would allow physics and engineering students a place to go in state.

“We’ve discussed ways we could improve physics in the state of South Dakota. Research at Homestake and Internet III, an ultra high-speed Internet used mainly for research, would be beneficial”

Right now, the fate of Homestake lies with NSF approval, perhaps in May or June.

“We hope to get chosen by the NSF as the DUSEL (Deep Underground Science and Engineering Lab) site. It would do more for South Dakota than it would for Minnesota, Washington State, or Colorado,” McTaggart laughs. “But that’s not my call.

“These things don’t come around too often. The Super Collider in the ’80s, which went to Texas instead of South Dakota, was the only thing with as large a potential impact as Homestake.”

Cindy Rickeman

Homestake plans contingent on NSF decision

At 8,000 feet, Homestake—the deepest mine in North America and the second deepest in the world—is well-suited for the study of life at extreme depth and would serve the underground needs of researchers in particle and nuclear physics, geology, hydrology, geo-engineering, biology, and biochemistry.

When Homestake Gold Mine closed in 2002, the huge pumps that controlled the water level were turned off and water began accumulating in the mine. Water has now risen to the 5,600-foot level and Governor Mike Rounds says pumps will begin flushing the water out if and when the National Science Foundation designates Homestake as a deep underground science and engineering laboratory. It is hoped the NSF will make its decision in May or June.

The South Dakota Science and Technology Authority, formed in 2004 in response to Governor Rounds’ 2010 Initiative, has been working toward the conversion.

The Homestake Interim Laboratory, at 4,850 feet, will be funded with a portion of the \$70-million donation from Sioux Falls philanthropist T. Denny Sanford, \$35 million in state money, and \$10 million in federal money.

The South Dakota Science and Technology Authority has developed a comprehensive plan to dewater the mine and make it available to science down to 8,000 feet.

In its work to convert Homestake into a science and engineering center that includes education, visitor, and outreach components, the authority has developed an outreach and education plan that includes local institutions, schools, universities, and minorities.

In a statement on the South Dakota Science and Technology Authority Web site, Dave Snyder, executive director, says, “The Homestake project has the potential to significantly advance the fundamental understanding of the physical universe as well as to make a major, positive impact on science education and economic development here in South Dakota.”

For more information:

Contact: Robert McTaggart, (605) 688-6306
Robert.McTaggart@sdstate.edu
Visit the Homestake Web site:
<http://www.state.sd.us/homestake/>



Girls, girls, girls!

College events attract young women to engineering

"The fact that we are not currently able to fill all the technology jobs and that we continue to see declines in the number of students going into technology-related majors, may mean we could lose that competitive edge in the marketplace."

— Alumna Becky Schmieding, executive certified project manager for IBM Rochester.

From left, Kim (Coover) Button '02/'03, U.S. Representative Stephanie Herseht, and Becky Schmieding '78 gather at the 2006 Ready, SET, You-Go-Girl workshop, which was held to stimulate an interest in engineering in high school girls.

Two first-time events last spring and fall brought nearly 100 young women to campus to spark their interest in engineering and showcase the opportunities that await them.

About sixty eighth graders came to campus for GEMS (Girls in Engineering, Math, and Science) in March and about thirty high school students came to Ready SET (Science, Engineering, and Technology), You-Go-Girl! in October. Both one-day camps were designed to introduce young women to various careers in technical fields.

The workshops are the brainchild of alumna Becky Schmieding, 1978 mathematics and commercial economics graduate. An executive certified project manager for IBM Rochester, Schmieding notes that women make up 52 percent of the population, but only 9 percent of engineers and 14 percent of computer scientists.

"I recruit at SDSU for IBM and have been noticing a drop off in the number of

female candidates we were getting from the College of Engineering in computer science and electrical engineering," Schmieding says. "This is not just a trend at SDSU, it is a nationwide trend."

IBM has been hosting a weeklong camp in Rochester, Minnesota, to interest girls in science, engineering, and technology for more than five years. Schmieding pulled the best activities from that week-long camp for these university workshops.

Early interest

Daktronics, Banner Associates, Sencore, Mid-America Power, East River Electric, 3M, and the SDSU Women's Giving Circle along with IBM sponsor these one-day workshops at SDSU.

"By taking it outside IBM, it is not just an IBM program, it is a community program," Schmieding says. "By running a one-day workshop at a university, we're able to bring in multiple industry professionals so girls get exposed to

females in the profession and can ask questions, not just to the academic side, but to the industry side. Having camps at universities is a great model for academia and industry working together.

"It gives us the capability to say, hey SDSU, these girls are interested in math and science. We help the College of Engineering connect with those students earlier in their high school careers. Hopefully, we'll be able to recruit these girls to SDSU in the future. If SDSU gets more students, then it will be better for us as industry reps because we'll have a larger pool of students from which to recruit. And everyone knows that SDSU students make very good employees, so it is a benefit to our companies.

"There's going to be a dearth of engineers in the U.S. soon and that is bad for our country, since technology is one of the strengths of the U.S. The United States is known as the technology leader of the world. The fact that we are not currently able to fill all the technology jobs and that

we continue to see declines in the number of students going into technology-related majors may mean we could lose that competitive edge in the marketplace," she says.

Even governments are seeing this as very important.

"Governor Rounds' 2010 Initiative is about training men and women to develop a technology base," Schmieding says. "So holding these workshops is a win-win-win scenario. A win for academia, a win for government, and a win for industry, which is something we all strive to achieve."

Having U.S. Representative Stephanie Herseth give the opening address at Ready SET, You-Go-Girl was a real boon but also an affirmation of the importance on a national level, Schmieding says.

"It was GREAT!"

Feedback from the girls attending was music to Schmieding's ears.

"I overheard a comment from one of the eighth grade campers," Schmieding says. "She said I wish school was this fun."

Jensi Prohaska, daughter of Kim and John Prohaska of Brookings, attended GEMS with a group of eighth grade friends.

"We did some forensic science stuff," Prohaska says. "I really enjoyed doing that. The instructors were really friendly and

fun to talk to. I had an interest in engineering, but didn't know much about it before I went. I know a little bit more now and would be interested in learning even more."

Prohaska, currently a ninth grader at Brookings High School, says she hopes to attend Ready, SET, You-Go-Girl now that she's a high school student.

Before Christmas, Schmieding was in Brookings when a receptionist recognized her from the workshop, and told her that her daughter attended camp, and was planning to become an engineer as a result.

"That's what I need to see," Schmieding says. "One girl is worth the time and energy I spend to set up this workshop. I'm sure the other organizers feel the same way."

Female professionals from regional industry as well as SDSU professors and students donate their time to plan and hold the workshops and they enjoy interacting with the girls, she adds.

Activities for the high school camp included writing a résumé and conducting an experiment wherein the girls learned how to purify and soften water.

"They had a chance to build a robot out of Legos and make the robot dance and drive through a pattern on the floor," Schmieding says. "It was fun for the kids."

They also wrote a computer program

to determine which school would be the better financial choice.

"I don't think girls have had many opportunities to program and therefore they think programming will be difficult," Schmieding says. "After the workshop, many of the students said they didn't know programming was so easy."

In the GEMS workshop, the girls learned about finger printing and solved a crime using forensic science, took part in bridge building, and 'met' some famous women.

"We looked up names of women who had done some interesting things we may not have recognized before," Schmieding says. "When we say the word 'inventor,' we don't really think of women. But women have created a lot of great inventions, like Teflon and Velcro. The girls realize they can do it too."

Cindy Rickeman

2007 dates:

2007 dates

GEMS will be held this year Saturday, March 24. Ready, SET, You-Go-Girl is scheduled for Saturday, November 3. For more information, call the College of Engineering at (605) 688-4161 or visit the Web site www.engineering.sdsu.edu/gems.

COLLEGE OF ENGINEERING SOUTH DAKOTA STATE UNIVERSITY

Undergraduate Enrollments Revised 10/11/2006

	YEAR	ABE	CEE	CSc	CM	EE	EET	E Math	EP	PHYS	GE	IM	MNET	ME	SAFM	SE	TOTAL MAJORS	TOTAL STUDENTS
First Year	2006	16 [1]	81 [8]	44 [2]	43 [0]	49 [5]	11 [1]	19 [12]	1 [0]	5 [2]	56 [2]	6 [0]	14 [1]	105 [4]	0 [0]	10 [0]	460 [38]	455 [37]
	2005	24 [1]	58 [6]	22 [0]	44 [0]	33 [2]	12 [0]	15 [6]	4 [0]	1 [0]	35 [1]	3 [0]	12 [0]	94 [2]		11 [0]	368 [18]	365 [18]
	2004	17 [1]	70 [3]	32 [4]	44 [0]	52 [5]	13 [0]	3 [2]	2 [0]	9 [0]	40 [3]	3 [1]	23 [2]	104 [2]		10 [0]	422 [23]	420 [23]
Second Year	2006	17 [1]	52 [4]	12 [2]	57 [1]	30 [1]	16 [0]	12 [2]	5 [0]	1 [0]	14 [0]	2 [1]	16 [0]	49 [3]	1 [0]	5 [0]	272 [16]	286 [14]
	2005	9 [0]	58 [3]	15 [1]	54 [1]	38 [3]	22 [1]	8 [3]	3 [0]	4 [0]	6 [1]	3 [1]	24 [2]	67 [2]		8 [0]	319 [23]	307 [17]
	2004	15 [0]	49 [6]	25 [2]	29 [1]	37 [3]	16 [1]	2 [0]	2 [0]	5 [2]	4 [1]	0 [0]	18 [0]	70 [5]		3 [0]	275 [21]	271 [21]
Third Year	2006	10 [0]	54 [5]	12 [1]	44 [0]	26 [2]	32 [1]	16 [6]	2 [0]	4 [1]	4 [0]	5 [0]	23 [1]	55 [2]	0 [0]	6 [0]	293 [19]	278 [18]
	2005	15 [0]	51 [8]	20 [2]	31 [0]	29 [4]	19 [0]	10 [2]	1 [0]	3 [2]	2 [0]	4 [0]	19 [1]	48 [5]		6 [0]	258 [19]	249 [23]
	2004	27 [3]	34 [5]	24 [2]	31 [1]	20 [0]	16 [2]	3 [0]	0 [0]	5 [1]	3 [0]	1 [1]	17 [0]	53 [1]		3 [0]	237 [16]	235 [15]
Fourth Year	2006	28 [1]	70 [12]	30 [5]	43 [2]	42 [4]	21 [1]	17 [3]	2 [1]	5 [2]	0 [0]	5 [0]	19 [1]	84 [5]	0 [0]	10 [0]	376 [37]	356 [34]
	2005	30 [3]	61 [10]	26 [3]	26 [2]	42 [3]	20 [2]	11 [2]	1 [0]	8 [2]	0 [0]	3 [0]	15 [0]	75 [2]		2 [0]	320 [29]	309 [27]
	2004	11 [1]	59 [11]	20 [2]	20 [1]	51 [7]	24 [0]	4 [1]	4 [0]	4 [1]	0 [0]	1 [0]	16 [1]	49 [2]		0 [0]	263 [27]	268 [26]
Undergrad Total	2006	71 [3]	257 [29]	98 [10]	187 [3]	147 [12]	80 [3]	64 [23]	10 [1]	15 [5]	74 [2]	18 [1]	72 [3]	293 [14]	1 [0]	31 [0]	1417 [109]	1375 [104]
	2005	78 [4]	228 [27]	83 [6]	155 [3]	142 [12]	73 [3]	44 [13]	9 [0]	16 [4]	43 [2]	13 [1]	70 [3]	284 [11]		27 [0]	1265 [89]	1230 [85]
	2004	70 [5]	212 [25]	101 [10]	124 [3]	160 [15]	69 [3]	12 [3]	8 [0]	23 [4]	47 [4]	5 [2]	74 [3]	276 [10]		16 [0]	1197 [87]	1192 [85]

Number of women in departments are shown in brackets

YEA ACE Summer camps

Igniting an interest in engineering, hundreds of high schoolers sample career possibilities



Whether it's a general interest in engineering or a particular attraction to aviation, high school students can find their niche at two camps hosted each summer on campus.

YEA (Youth Engineering Adventure) has drawn between seventeen and fifty-four students to campus each June, with a total of 169 attendees at the five camps held at State thus far. The venture began in 2002 at SDSU and the year before at the South Dakota School of Mines and Technology in Rapid City.

"It's patterned after YBA [Youth Business Adventure] Camp at USD for business students," says SDSU camp coordinator Mylo Hellickson, professor of agriculture and biosystems engineering. "We figured we could do the same thing or better for engineers. The goal is to encourage young people to be excited and take on the challenge of an engineering education, so they can live their dream if that's what it is.

"YEA Camp does a very good job, and there's a real value in doing it," Hellickson continues. "The driving force is the shortage of engineers; more are retiring than are graduating. We need to stimulate that young person with an interest. It's a good opportunity for them to see if it's something they'd like to do. I think we give them a pretty nice package. And we have fun with it."

Campers build and take home robots, single piston engines, and FM radio transmitters. They tour EROS and Daktronics. Retired engineers lead the groups and faculty teach the sessions.

Around every corner

For one activity, campers visit a local grocery store and identify everything associated with engineering.



"They always get the price scanner, but not the parking lot, drainage, lights, ovens in the bakery, the shelves in the deli, air conditioning," Hellickson says. "The floors have to be designed to be easy to clean, but safe to walk on with wet shoes. They start seeing that engineering is absolutely everywhere."

Other activities further drive that point home.

"I always pick two or three topics," Hellickson says. "Electricity from Pierre. That involves hydrology. Someone had to build the dam and design the tubes to

"Some are working with NASA, the Air Force Academy, piloting for major airlines. Even if we just sparked their interest in science and engineering, it gives us a nice, rosy feeling that we made a difference."

—Kevin Dalsted on ACE Camp alumni

bring the water to turn the turbines to run the generators. Milk. That involves designing farm equipment, taking in mind environmental impacts. A mechanical engineer designed the truck. A civil engineer designed that highway. "If they're excited about something, there's probably a place for them in engineering."

A survey of former YEA campers who have graduated from high school indicates that nearly half are majoring in engineering at SDSU or Mines, says Rich Reid, assistant dean of the College of Engineering at State. Also, a quarter of the Briggs Scholarship interviewees at State the last three years were YEA campers.

ACE Camp

Since ACE (Aerospace Career and Education) Camp began in 1992, more than 280 students have attained a basic knowledge of the properties of flight and how aircraft work as well as an introduction to the variety of careers available in the field.

Every July, campers are treated to a variety of tours, including the Air National Guard Base in Sioux Falls, EROS Data Center near Baltic, and the Sioux Falls Air Traffic Control facility. After a session on a flight simulator, they take to the sky in an actual airplane. They build and launch model rockets and learn about alternative fuels.

The survey says . . .

A survey of past attendees is helping to determine the impact camp has had on their educational and career choices.

"These kids have graduated from high school, have graduated from college, and have made their career choices," says Kevin Dalsted, director of the Engineering Resource Center, "What we're trying to get our hands around is how ACE Camp entered into that."

The survey was sent to 291 former ACE Campers; fifty-nine, or 20 percent, responded. Of all respondents, 76 percent are in college or the working in the profession and 24 percent are still in high school.

"Of the alumni beyond high school age, all but one finished a four-year degree," Dalsted says. "Some are working with NASA, the Air Force Academy, piloting for major airlines. Even if we just sparked their interest in science and engineering, it gives us a nice, rosy feeling that we made a difference."

The survey, conducted by Shannon Lane, a doctoral candidate in rural

sociology, showed that, of the university and professional sample, twenty-five attended in-state and twenty attended out-of-state schools.

"Not only are we retaining them in college," Lane says, "we're retaining them in in-state institutions."

Cindy Rickeman

OPPOSITE PAGE, TOP: Campers concentrate on their engineering design project at Youth Engineering Adventure June 13, 2006.

OPPOSITE PAGE, BOTTOM: Youth Engineering Adventure campers get hands-on application in geographic information science outside Crothers Hall June 14, 2006.

LEFT: Future astronaut Valerie Halbur poses in a space suit at the Washington Pavilion in Sioux Falls at the 2006 ACE camp.

RIGHT: Counselor Sarah Smith straps in for a flight in Lynn Riedesel's Extra 300 Aerobatic Airplane at the 2006 ACE camp.

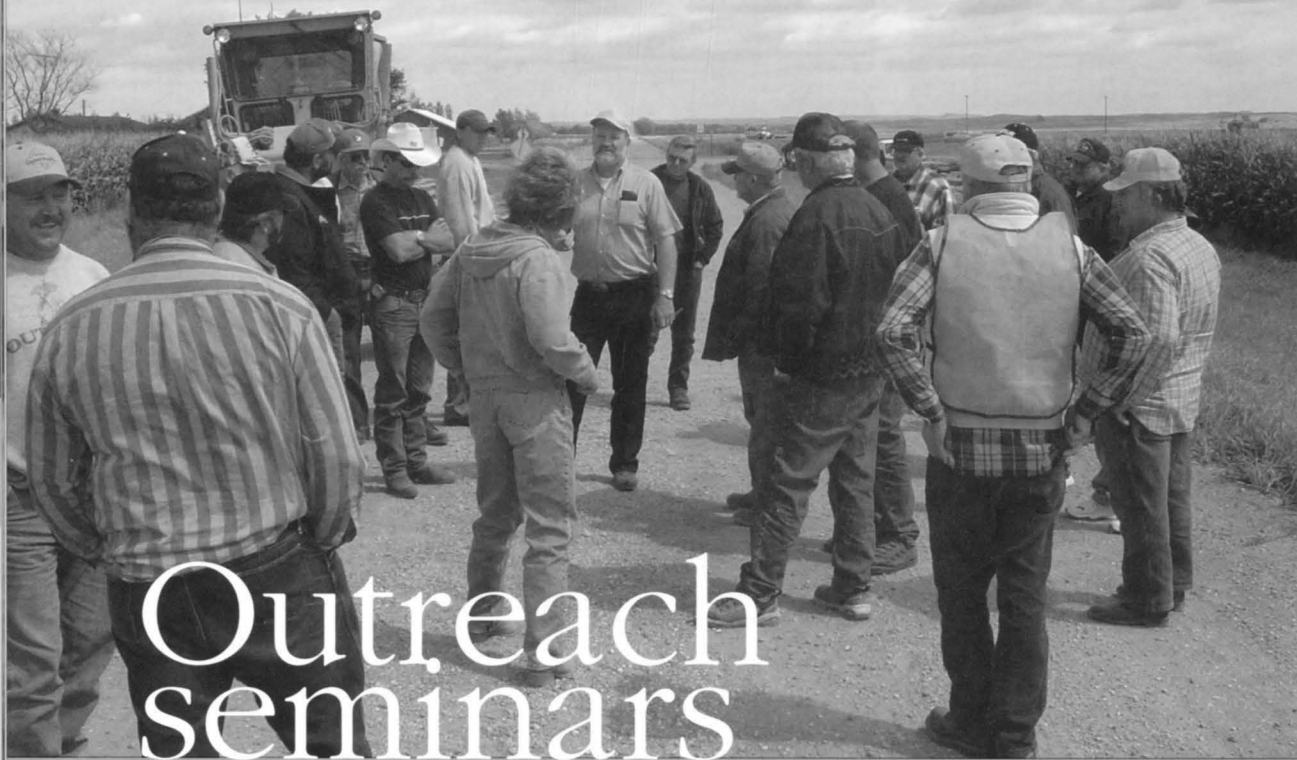
For more information and 2007 dates:

YEA Camp: June 10-14

<http://www.engineering.sdstate.edu/~yea/>
Mylo Hellickson, (605) 688-5610
Mylo.Hellickson@sdstate.edu

ACE Camp: July 15-19

<http://www3.sdstate.edu/Academics/CollegeOfEngineering/redirect/EngineeringResourceCenter/ACECamp/Index.cfm>
Engineering Resource Center, (605) 688-4184



"I'm confident we've saved a lot of hands and fingers over the course of all these years."

– James Manning
on the OSHA
Consultation
Program.

Outreach seminars

continue College's mission to teach

Faculty members not only teach students in the classroom, they share their expertise with thousands of men and women throughout the region every year through outreach seminars.

"Our training season runs from fall to spring," says James Manning, program director for Engineering Extension, which typically conducts some fourteen seminars each year. "We average 500 attendees in any given year."

Its ethanol training is the department's brainchild as well as its pride and joy.

"We're the only ones nationally who do ethanol training," Manning says. "We were the first safety and health entity to get involved specifically in ethanol. We're really quite proud of that."

"We started early on this. We saw the development of the industry and knew there would be a need in the ethanol industry for seminars and training specifically for ethanol fuel production. We first offered training in 2004. They're open to all ethanol plants in the U.S. We have gotten an excellent response."

Engineering Extension also conducts ten-hour courses for general industry and construction.

"The ten-hour courses are special," Manning says. "They're sanctioned by OSHA and each participant gets a card

issued by OSHA. Other seminars [in machine guarding and spray finishing; trenching and fall protection; and asbestos recertification] are not nationally sanctioned, but are offered for the benefit of industries in the state.

"We're confident we are reducing occupational injuries and illnesses in South Dakota," Manning says.

That's the seminar effort by Engineering Extension. Faculty members spend the rest of their time on the OSHA Consultation Program, funded by a federal grant from OSHA.

"We do on-site safety and health audits," Manning explains. "We go to businesses and plants and do a safety walk-through, air quality sampling. The entire staff goes to 200 businesses a year."

"In a typical safety audit, we find twenty-five serious safety hazards. Everything is free of cost, but the company is obligated to abate the serious hazards found. I'm confident we've saved a lot of hands and fingers over the course of all these years."

Revival

New hosts, new purpose, new name, new place.

When the University/Industry Technology Service changed its funding model, the management of the annual

Excellence in Industry Symposium held each April in Sioux Falls was taken over by three College entities: the Engineering Technology and Management Department, the Product Development Center, and the Engineering Resource Center.

The symposium was repurposed to meet the needs of entry to midlevel managers and renamed the Leadership and Productivity Development Conference. Moving the event to Brookings and changing the format to a series of one- and two-hour applications-based workshops on personal development and workplace productivity has been a successful formula.

"The underlying theme of quality still remains," says Teresa Hall, head of Engineering Technology and Management. "But we felt there was an underserved market for technical professional development in northeast and north central South Dakota. We've been very successful by adapting the conference to serve specific needs for economic development in the Upper Great Plains."

Last year 150 people from thirty different organizations in four states attended the conference—"we had an excellent array of business sectors participating, such as food processing,



energy distribution, banking and finance, and construction in addition to our core group in manufacturing,” Hall says. “The most consistent comment was that they liked the one-day format. It was valuable information they could use immediately.”

Sessions were offered on value stream mapping, ISO 9000 auditing, kaizen, quality management tools, applied statistics, process based auditing, self-directed work teams, and professional certification.

“We provided them information, networking, and ways to improve their productivity,” Hall says. “If you can bring that to the newly hired engineer, the mid-career supervisor, or the general manager, it is a value-added benefit for South Dakota.”

“We want to send the message the College of Engineering is here to serve them. An underlying goal is to make it into a networking event as well, to bring people together from different companies in the region, and help them to expand their professional network. It also drives home our point that the College of Engineering is a resource for them.”

That certainly rang true for Marty Kloster, director of lean manufacturing for Rainbow Play Systems in Brookings, who attended the conference for the first time last fall.

“We got a lot of good information on lean manufacturing, which we found very useful because Rainbow just started its lean journey this year,” says Kloster, who was also a presenter. “There was a tremendous amount of information. Also a lot of networking, which was very

beneficial. We solidified our link with SDSU.

“The conference was absolutely outstanding. It was a home run.”

Cindy Rickeman

OPPOSITE: Ken Skorseth, South Dakota LTAP field services manager, (center, facing the group) explains principles of proper crown and shoulder shaping to county highway superintendents, field foremen, and motorgrader operators at a training session near Salem in McCook County.

ABOVE: Gary England, right, operations foreman at the Brookings water and wastewater plants, calibrates a pH meter while Del De Boer and others enjoy a laugh at an October 28, 2005, training session in the environmental laboratory at Crothers Engineering Hall. This was the second year that De Boer offered the training through the South Dakota section of the American Water Works Association and the Northern Great Plains Water Resources Research Center at SDSU.

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Reaching thousands through the years

Whether it's about maintaining winter roads or using a new concrete, the College has its people out and about throughout the year training, advising, and sharing information with those working in the field.

The Department of Civil and Environmental Engineering hosted its forty-fifth annual asphalt conference in March 2006 in Pierre and its thirty-first annual structural seminar in November 2006 in Sioux Falls. In comparison, the department's geotechnical engineering seminar is the new kid on the block. Begun in 2000, it's held every other year, in December in Sioux Falls, with the next one slated for 2008.

Seventy to 100 industry representatives from throughout the region attend each of the three seminars.

The department has also conducted a Water Analysis Laboratory Training Class the past two years. Sessions are held once or twice a year on campus and once a year off campus, with Fort Pierre the site last year and Aberdeen the prospective site this year. At least a dozen water treatment plant operators attend each session.

For the past eighteen years, the South Dakota Local Transportation Assistance Program has conducted full- or half-day workshops on gravel roads; equipment management; winter maintenance; work zone traffic control; risk management; culvert installation; surveying; geo-textiles; drug and alcohol detection; back injury prevention; asphalt paving; safety awareness; and personnel management.

The program conducts some fifty-five seminars each year, with an average annual attendance of 1,500. The total for 2006 was 1,974 participants.

In addition to its seminars, the program staff offers technical assistance on-site in a local street or highway department, or via telephone or e-mail. Last year alone, staff recorded 513 technical assists, ranging from providing training videos to conducting research to get the information local customers need.

Cindy Rickeman



helps fund program targeting Native Americans

The distance between a federal Indian boarding school and a college campus is getting shorter, thanks to a grant from the Citigroup Foundation.

This is the second year that the Citigroup Foundation has provided a \$15,000 grant to fund the senior year program of the SDSU-Flandreau Indian School Success Academy.

Now in its seventh year, the Success Academy is a program directed by MaryJo Benton Lee, diversity coordinator for the College. It is a universitywide partnership with Flandreau Indian School, about twenty-five miles from Brookings.

The Bureau of Indian Affairs school attracts students from about thirty different states and about sixty different tribes. But many students in the diverse group now share a common goal—continuing on to higher education after they finish their four years of high school at FIS.

“Before Success Academy very few FIS grads went to college. Now there is a growing number,” Lee says.

Numbers improve

Specifically, from 1997 (the earliest records are available) to 2003, only six students from Flandreau Indian School enrolled at SDSU. Since then, twelve enrolled—five in 2004, five in 2005, and two this year. Those who enrolled in 2004 were the first to go through four years of Success Academy.

Beginning in 2005-06, the final year of Success Academy has become a capstone program.

“Having the grant allowed the University to put together a package and make it something special for our [FIS] seniors,” Lee says. Called “Countdown to College,” the program enrolls the students in two college classes and takes them through college preparation activities like the ACT exam and financial aid applications.

The final year is limited to ten students with preference given to students planning to enroll at SDSU.

College prep classes

Basic Writing (English 033) is taught in the fall and Basic Algebra (Math 021) is taught in the spring. Each of the three-credit classes is taught at the end of the day and are special sections designed for the FIS seniors.

Once a week, the students are bussed to Brookings. The other day, the instructor drives to Flandreau.

“Before we had the funding, we were noticing that almost all of the students coming here [from FIS] were testing behind in English and math,” Lee says. “The classes give them a step up so they had the needed basic skills.”

Citibank desires

Jerry Nachtigal '81, vice president of public and government affairs at Citibank, took a quick interest in Success Academy.

He became aware of the program when the students were introduced by the public address announcer at an SDSU basketball game that Nachtigal was attending, Lee relates.

Nachtigal says, “The Citigroup Foundation and Citibank South Dakota have found the Success Academy to be both creative and innovative—but above all, it makes a huge difference in the lives of young Native Americans who choose to pursue higher education.”

The grant pays for university tuition and fees as well as books and supplies, the instructor's travel to Flandreau Indian School, and the salary for a mentor/

SDSU-FIS Success Academy short course

What: A partnership created six years ago with the College of Engineering and Flandreau Indian School. It now involves the entire University.

Where: Students visit SDSU fifteen times between their freshman and senior years.

Why: Success Academy has two goals—to help more American Indian students prepare for and succeed in college, and to make SDSU the kind of place where that happens.

Year One: All FIS freshmen (about seventy-five) make seven afternoon visits to SDSU to attend hands-on workshops in each of the colleges and to learn about careers.

Year Two: All 100 sophomores attend four focus days at SDSU—Focus on the Military, Focus on the Arts, Focus on American Indian Studies, and Focus on Health, Physical Education and Recreation.

Year Three: Twenty-five college-bound juniors make four visits to SDSU, learning about topics ranging from taking the ACT to getting financial aid and deciding on majors.

Year Four: Ten college-bound seniors take a spring and fall class at SDSU and complete all steps necessary for college admission.

Coordinators: MaryJo Benton Lee, College of Engineering, SDSU; Sandra Koester, assistant principal, FIS.

teacher. The mentor works with the students on the three days per week that they're not meeting with SDSU instructors.

Finding success

This year that instructor is Melissa Opsahl '04, a first-year Flandreau Public School math teacher.

A major role she plays is providing structure, "someone who is making them do their work. Previously, when they were left on their own, being high school students, they wouldn't always do their work. I help make sure they're prepared when they meet with teachers," Opsahl says.

While it would be easy to do all the teaching in Flandreau, the campus connection is vital, Lee says.

"They see they can be a college student, which is huge for our students. They see they can succeed and pass their classes, and they like it," the Success Academy founder notes.

'A glorious feeling'

Campus sessions are often extended. That's when people from admissions and financial aid meet with the students. Each student fills out an enrollment application. When students receive a letter

of acceptance from SDSU, it's "a glorious feeling," Lee shares.

Vanessa King, an SDSU freshman majoring in journalism and sociology, was in the Success Academy for three years.

"It was a hidden opportunity that I hadn't recognized at first; a doorway to a bigger opportunity for me. Before Success Academy I hadn't thought about college," says King, who grew up on the San Carlos Reservation in Arizona as a member of the Apache tribe.

A \$5,400 gift from the South Dakota Space Consortium adds to the Citibank funding.

Dave Graves

Phonathon: Record total

Student callers also gain skills, advice, perks



After the first weekend of this year's engineering phonathon, Nick Haltvick and Dan Kruse were worried.

With a caller shortage, fundraising fell about \$15,000 behind pace, the co-chairmen said. But despite its slow beginnings, the week proved a record-breaking event—surpassing last year's fundraising totals by more than \$13,000.

Held January 27 through February 3, the phonathon raised \$178,145 for the College of Engineering, compared to last year's record \$165,060.

With sixteen phones available at the SDSU Foundation's Calling Center, there were six to eight students placing calls to alumni from throughout the nation on the opening weekend.

However, department officials and students increased recruiting efforts to fill more of the calling stations the rest of the week.

For Haltvick and Kruse, however, the impact of the fifty-plus hours of calling

goes beyond providing new equipment, new computers, and updated classrooms as well as funding for student organizations.

The phonathon provides a powerful lesson in leadership and getting students involved.

"It's been rewarding," says Haltvick, a junior civil engineering major. He described his co-chairman experience as a way to learn "the little stuff they don't teach you in school," like how to communicate during meetings.

The role helped Kruse build courage to speak in front of groups, he says.

"Involvement with the College of Engineering is definitely an encouraging way to get involved," Kruse says. "The secretaries were really cool, too."

Nurturing progress, rivalries

As co-chairmen, Haltvick and Kruse worked with a group of between twenty-five and thirty students to plan this year's phonathon. The duo began preparing for

Nicki Hoffmann, a Phonejacks supervisor from Staples, Minnesota, helps Darren Eichacker, left, of Salem, and Tom Langum, of Brookings, during the 2007 Engineering Phonathon February 1. Eichacker and Langum are both seniors majoring in manufacturing engineering technology.

the event in October by devoting about two hours a week to the event, Haltvick says.

"You got to keep up with school," he says. "It's a huge time commitment and it really takes a lot of energy."

Students divide into committees (such as marketing and training groups), and hold meetings every two weeks, Kruse says.

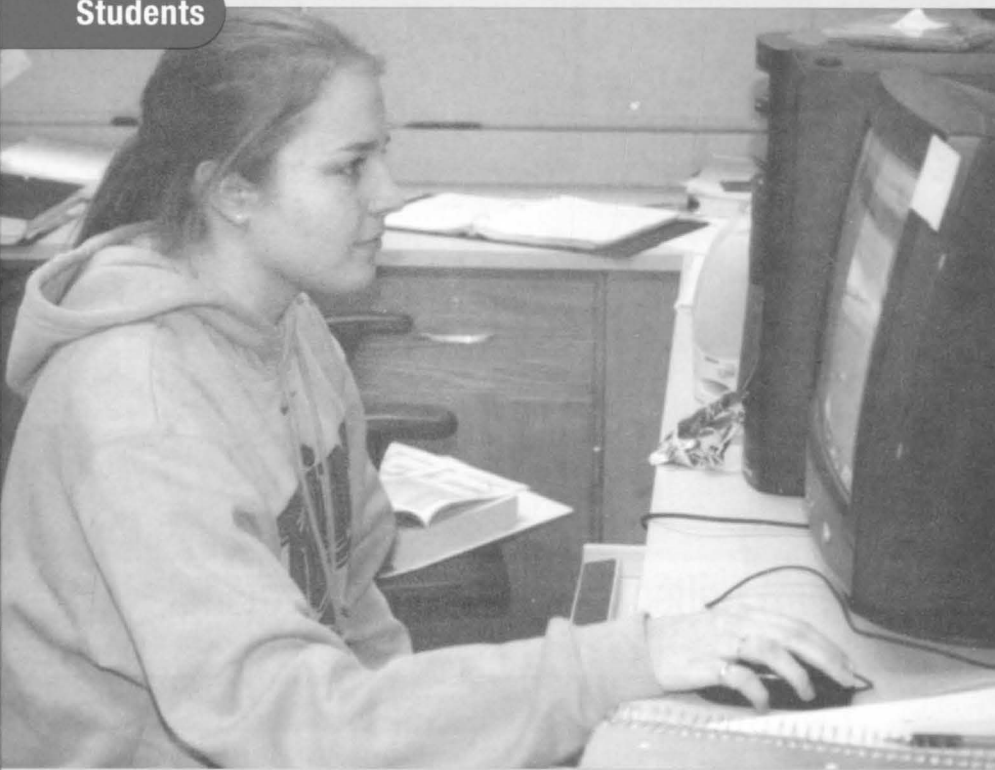
While students work hard to make phonathon happen, those involved earn a few perks as well.

"Each department kind of had their own incentives for people to call," Kruse says. In addition to giving away movie tickets and sweatshirts, organizers held a grand-prize drawing for \$200 Brookings Bucks.

"It's fun seeing it all coming together in the end," says Haltvick, noting that the different engineering departments engage in a friendly phonathon fundraising rivalry.

"Free food is always cool too," Kruse says.

Denise Watt



Grad students make impression in engineering domain

Everybody has a story to tell. For Amanda Boushek, Alfred Furth, and Cory Mettler, their engineering paths are quite different. Yet, they have one common element: their SDSU engineering education.

Here's a short snapshot of their lives and what brought them to the Brookings campus.

Fast track research

At Yellow Medicine East High School in Granite Falls, Minnesota, Boushek belonged to the Junior Engineering Technical Society, an elite bunch that excelled in math and science. They would engage in area competitions and generally promote the respective academic fields.

Today, the young engineer is competing again, only this time she is striving to finish her thesis and graduate in May owning a master's degree in engineering with an emphasis in structural engineering.

A civil engineering graduate in May 2006, Boushek's project is studying the use of self-consolidating concrete for box culverts in South Dakota using local aggregates.

Self-consolidating concrete is relatively new in North America. Due to the way it is mixed and chemicals used, the

concrete is self-flowing, meaning no concrete vibrators or other mechanical devices are required to make sure the concrete flows and fills all spaces.

The South Dakota Department of Transportation does not allow self-consolidating concrete because there is a lack of sufficient data on its performance using local aggregate. But with research like Boushek's, use of the new concrete may be just around the corner.

"Self-consolidating concrete flows great and is sensitive to water content," she says. "It's really ideal for box culverts because their walls are thin and the concrete fills in nicely with no vibration."

The plan is for some box culverts to be made with self-consolidating concrete and graduate students will go out in the field and document their performance," according to Boushek. "This project is on the fast track and someone will take it over when I'm done," she says. "It's an important project for the DOT and I'm glad to be associated with it."

Football to a doctorate

Furth's first exposure to SDSU was 1993, when his high school team from New Ulm, Minnesota, came to compete in the SDSU High School Mathematics Contest.

Fast-forward thirteen years, he is back at State seeking a doctorate in computational science and statistics. "It's rather interesting, isn't it?" says Furth of his return.

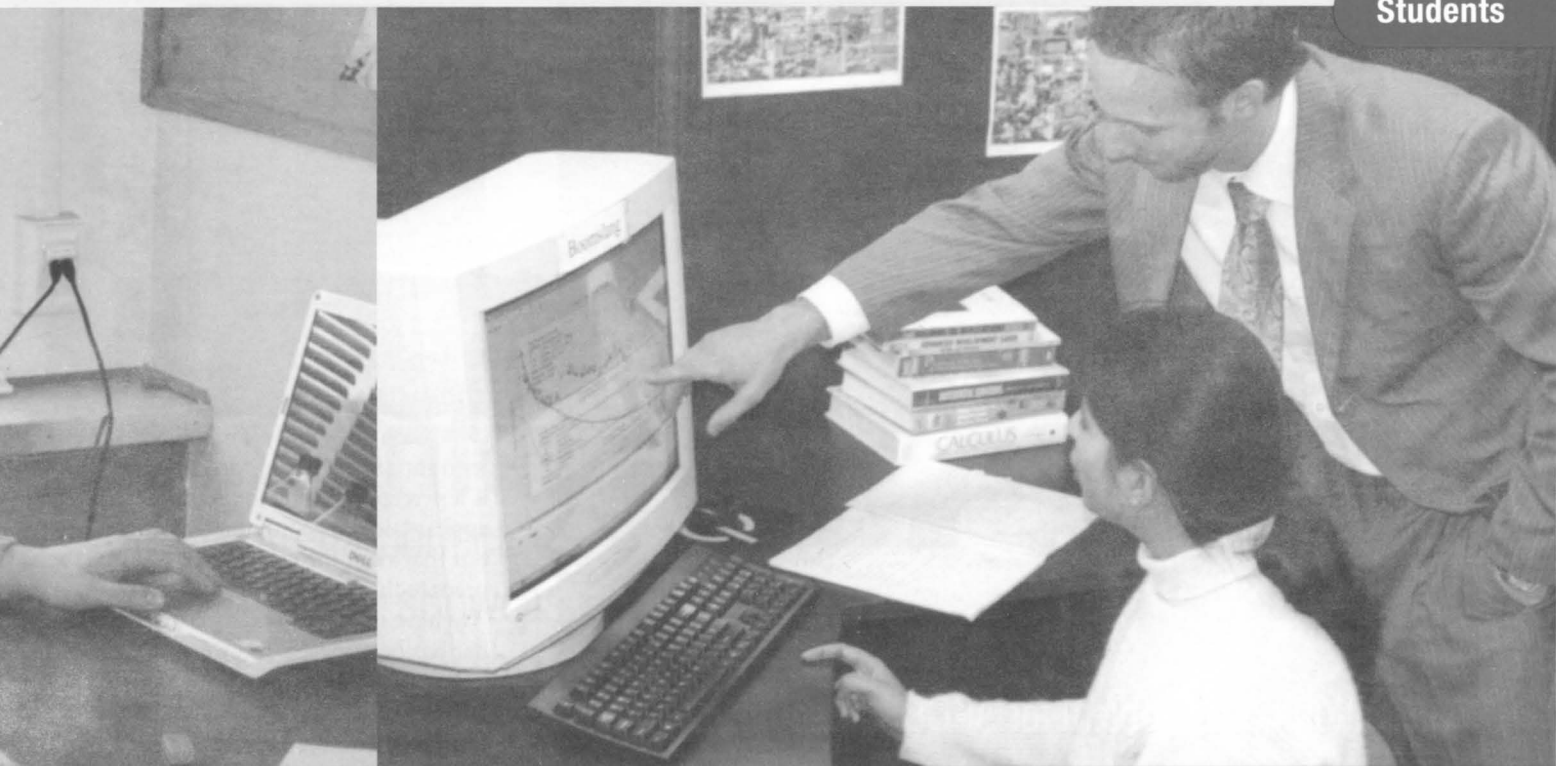
However, Furth is completely satisfied how it turned out. He enrolled at St. Olaf College in Northfield, Minnesota, where he earned a math degree with a concentration in statistics. He also played football for the Oles' as an offensive tackle.

"St. Olaf has a really strong math program and has one of the highest rates in the country for the number of students who get their Ph.D.," says Furth. "That was the big reason for going, plus I also went there to play football."

Furth joined the Mayo Clinic and worked as a statistician for eight years. His main role was to provide statistical consulting support to physicians conducting clinical research for the Mayo Clinic Cancer Center and the North Central Cancer Treatment Group. At the same time, he was taking graduate courses online from Iowa State University, and after four years, was promoted to a master's level statistician.

Looking to advance, Furth opted for SDSU's doctoral program.

"I reached the point where I couldn't take on a supervisory role and I always



had it in the back of my mind that if the right opportunity came I would pursue a Ph.D.," he says.

"I liked SDSU because it offered more of a computational degree," he adds. "The Ph.D. programs at some of the bigger universities are more theoretical. I wanted something more applied and SDSU stood out."

Furth expects to finish in three to four years. He and his wife, Heidi, and son, Mason, live in Sioux Falls, where Heidi is a nurse practitioner at Avera McKennan Hospital. She is a 1999 SDSU nursing graduate.

Furth, who taught a statistics class in the fall and is a research assistant for the spring semester, indicates his post-doctorate plans are open.

"I will have different options to explore," he says. "I could teach or work at a hospital in a research setting. For now, I'm concentrating on my work and studies here at SDSU."

Wrestling to teaching

Electrical engineering hiring rates were extremely low in the months following 9/11, a fact Mettler learned after earning his bachelor's degree in electrical engineering in May 2002.

"I was real sure that I wasn't going to go on (for a master's degree), but when I was graduating I didn't have a lucrative job offer, and with the job market the way it was then, it didn't look promising," says the Rochester, Minnesota, native. "I talked to Dr. Helder (electrical engineering and computer science department head) and he really encouraged me that master's degrees are a good thing."

Mettler recalls that when he expressed how much he enjoyed Helder's image processing class, the professor responded, "Well, there is no question that you should stay and work in my image processing lab as a graduate research student."

After Mettler completed his thesis on the calibration of the Landsat 4 satellite, his master's degree in electrical engineering brought him into the teaching realm as an instructor of electrical engineering and computer science January in 2005.

Not only well known in the electrical engineering department, Mettler is also synonymous with the SDSU wrestling program. An academic all-American in 2000, Mettler's mat career was cut short after two-and-one-half years due to a rash of injuries, including shoulder ailments, a broken ankle, and severe tendon damage to his thumb.

Mettler acknowledges his student-athlete background comes in handy when interacting with students.

"I relate well with electrical engineering students because I went through the program," he says. "At the same time, I have a unique relationship with students in extracurricular activities because I know what they go through in terms of practice and competition."

Mettler admits a doctorate is his next step. "I'm seriously thinking of getting my Ph.D.," he says. "A doctorate brings research into a program so I'm contemplating my next move."

Kyle Johnson

FROM LEFT:

Amanda Boushek works on her thesis studying the use of self-consolidating concrete for box culverts in South Dakota using local aggregates. She will graduate in May with a master's degree in engineering with an emphasis in structural engineering.

Alfred Furth first came to SDSU in 1993 for a high school math competition. Now he is back studying for a doctorate in computational science and statistics.

Cory Mettler earned his undergraduate degree (2002) and master's degree (2005) in electrical engineering at SDSU. Now he is an instructor of electrical engineering and computer science, helping students like Rimy Malla on a research project.



ASCE

Motivation not a problem for ASCE student chapter

How well a fire burns depends on the material being consumed. For the student chapter of American Society of Civil Engineers at SDSU, it doesn't take much to ignite some hot flames when it comes to promoting the profession of civil engineering.

The chapter's dedication to the field is reflected in the habit it has in winning regional and national awards.

In blunt terms, if the students didn't care, there would be no story. However, that's certainly not the case for a group that consistently ranks among the best ASCE student chapters in the country.

The chapter has been judged as the best in its zone for eight consecutive years from 1999 to 2006. Six times during those years the chapter has received the vice president's award for zone three, which is one of four zones in the country, and spans the nation's heartland from North Dakota to Texas.

During that same time frame, 1999 and 2004, the ASCE students captured the Robert Ridgway Award as the most outstanding student chapter in the United States, which is quite a compliment considering there are about 250 total chapters nation wide.

Community projects a key

Chapter awards are based on a point system with community service projects being the most influential factor. Of the more than twenty service projects ASCE annually undertakes, the City of

Brookings Storm Water Management Program was a prime example and a signature piece for the 2006 vice president's award.

Needing to comply with federal regulations, the city asked ASCE for help in spray-painting a stencil next to storm sewer inlets that read "Drains to Stream." The project is intended to discourage illicit dumping into the storm sewer system.

"We have a very active group that is extensively involved with community service," says ASCE President Nick Haltvick, a junior from West Concord, Minnesota. "We have a whole host of things we do from competitions to conferences, and everything we do is documented very well, too."

Indeed, it's all about presentation, and every year the chapter scores a good number of points with an annual report that chronicles in great detail all the activities for the year, ranging from field trips, civil engineering seminars at local schools, to building projects like Habitat for Humanity, and blood drives.

Chuck Tiltrum retired from the civil engineering faculty in 2005 after twenty-four years with the College. He was the ASCE faculty advisor during those years and remains as a practitioner advisor, meaning an advisor outside the faculty.

Named Outstanding Student Chapter Faculty Advisor three times, Tiltrum says the students never cease to impress him.



"I am constantly amazed at the amount of things they do," he says. "There is a perception that students sometimes appear laid back and don't get too excited, but that's not the case. When it's time to prepare the annual report, they always say, 'We have to do as good as last year. The bar has been raised and we aren't going to lower it!'"

Students equal success

Assistant Dean and Professor of Civil and Environmental Engineering Rich Reid, who succeeded Tiltrum as faculty advisor, says the source of the chapter's success comes from the students themselves.

"They continue to take on new challenges and engage in activities that improve the organization and the profession of civil engineering," he says. "They have developed good leaders, many students pitch in and help, and they have been led by a great advisor in Chuck Tiltrum.

"With that success they continue to enjoy strong support, starting with the faculty, continuing through the dean's office, and right up to the president," adds Reid. "Our chapter, with the record of accomplishments it has achieved, provides a model for this campus and ASCE chapters across the nation."

Kyle Johnson

LEFT: Trick or Treat for Cans was one of many community service projects for the ASCE student chapter. On Halloween, students asked Brookings residents for nonperishable food items. The can goods were donated to the Brookings Food Bank. Making the venture were, first row, from left, Jen Nelson, Abby Drews, and Eric Lynne. Second row, Joseph Galvin, Brian Rogness, Adam Roark, Brent Krohn, and Lacey Brehm.

RIGHT: The City of Brookings Storm Water Management Program was a highlight of the community service projects for the 2006 vice president's award. Jen Nelson (pictured) and Michael Kruse spray-painted a stencil next to storm sewer inlets to discourage illicit dumping into the storm sewer system.

Senior Design Conference

Arena perfect for students to test, showcase engineering skills

The Senior Design Conference marked its twelfth anniversary in 2006. It has been a major success story since its inception in 1995 by former Dean Virgil Ellerbruch.

Senior design projects are completed by student teams during their last two semesters before graduation. At such time, seniors have already completed much of the technical component of their coursework and must then apply it to address practical problems.

At this year's conference in November, students were given a chance to present their team capstone projects in a formal conference setting. The presentations require much planning and coordination, and they offer the attendee an opportunity to hear students describe their individual contributions.

The success of all professional engineers and technologists depends on not only their technical abilities, but also their skills in written and oral communications, according to Dean Lewis Brown.

"Professional engineers and technologists require these skills for everyday work in their interactions with other technical professionals, sales, and marketing personnel and customers, he says. "The most brilliant professional will have only limited success without mastering effective communications skills.

"The Senior Design Conference provides a showcase of senior-level team design projects," adds Brown. "It highlights the team and communications skills of our newest class of graduating engineers and technologists."

Senior design projects

A total of thirty-five senior design projects were developed in seven departments during the 2006-07 academic year. The number in parentheses reflects the projects done in that department.

Mechanical Engineering (7)

Hydraulic Ladder Rack Redesign

Presenters: Eric Dobbs, Jim Feldhacker, John Feldhacker, Robert Millbrandt, Scott Radigan.
Advisor: Don Froehlich.
Sponsor: Terry Dieren.

Description: The redesign a ladder rack for Crimson Fire, which produces custom fire trucks in Brandon. Their current ladder rack system requires excess mounting space on the fire truck. It requires an accuracy level that Crimson Fire could not provide to create its bulky design, and it was limited by its range of motion. The new system will be proposed to Crimson Fire as a viable replacement to the current ladder rack system.

Auto-Scroller

Presenters: Michael Nelson, Larry Rossow, Chris Livermont, Eric Young, Elliott Strain.
Advisor: Don Froehlich.
Sponsor: Twin City Fan.

Description: Centrifugal fan designs require the housing pieces to be welded by hand. The team was to come up with a machine that would automatically attach the scroll to the sides of the housing. The design was scrapped in favor of a welding robot. The team is to design a mechanism to allow fan housing to be mounted to the handler, clamped tight, welded, and removed with ease.

Continued next three pages

"The Senior Design Conference provides a showcase of senior-level team design projects. It highlights the team and communications skills of our newest class of graduating engineers and technologists,"
– Dean Lewis Brown.

Officers a leading component of ASCE

The overall success of the ASCE student chapter is due in large part to the commitment of its officers.

Chuck Tiltrum retired from the civil engineering faculty in 2005 after twenty-four years with the College. The ASCE faculty advisor during those years and currently a practitioner advisor, he indicates there has been a consistent continuity and carryover of good student officers.

"Getting the students involved early and having them hold office has made a big difference," he says. "We have a strong group of officers."

ASCE club membership hovers around seventy-five every year.

The leadership structure for 2007 features: Nick Haltvick, president; Jen Nelson, vice president; Andrew Natzel, secretary; Tyler Niemeyer, treasurer; Brent Krohn, corresponding secretary; Brittni Stephens, community service coordinator; Neal Konda, recruitment chair; Joe Schnetzer, Joint Engineering Council representative; Adam Simmons, sophomore representative; and Mark Horn, freshman representative.

"We've always had a great group of officers who are really gung ho about things," remarks Haltvick. "People generally care and that speaks well of our officers."

Kyle Johnson

How to Tame a Wild Mustang

Presenters: Matt Nelson, Jessica Pettibone, Cody Swenson.

Advisors: Shawn Duan, Doug Peters, Mary Tolle.

Sponsor: Gehl Mustang.

Description: The design and implementation of an engine mounting plate to be welded into the chassis of a Gehl Mustang skid loader.

This was done to eliminate the current engine mounting system, which includes iso-mounts and expensive hydraulic tubing, and to create a new money and labor saving system.

Royal Plastics Automated Parts Assembly Process

Presenters: Trevor Rollenhagen, Jeff Haliburton, Aaron Onken.

Advisor: Don Froehlich.

Sponsors: Royal Plastics – Brian Burkhalter, Chris Peterson.

Description: To design and fabricate an automated system to assemble vertical sliding widow locks. The system rivets two parts together and is run without human intervention except to refill feeder bowls or respond to an alarm. The system is controlled using a programmable logic controller.

TFL Heat Recovery Wheel

Presenters: Aaron Schmitz, Brian Burke, David Jahraus, Jordan Miller, Kyle Stytsma.

Advisors: Kurt Bassett, Don Froehlich.

Sponsors: McQuay International, Johnson Controls.

Description: The design of an air-to-air heat recovery system utilizing an Xetex AiRotor donated by McQuay International for use in thermal fluids lab. The design includes the construction of a cabinet to house the system, selection of blowers and motors, and the implementation of temperature and pressure sensors.

Biker Golf Bag

Presenters: Travis Luebke, Nate Althoff, Pat Connelly, Kade Ewert.

Advisor: Don Froehlich.

Sponsor: CTD Incorporated.

Description: There is no way to transport golf clubs on a motorcycle in an enclosed case. The project objective is to design a system to mount a carrying case onto the back of a motorcycle. The system is designed to attach and detach from the motorcycle in less than a

minute. It does not alter or cause any damage to the body of the motorcycle.

Quality Control Automation Project

Presenters: Kyle Maurer, Justin Almond, Mark Livermont.

Advisor: Don Froehlich.

Sponsor: Falcon Plastics - Steve Schwartz, Randy Derby.

Description: The creation of an automated quality control process that will eliminate about three-quarters of a person's labor. Currently one person loads plastic components into a circular rotating device, which takes them from the first loading point to an ink stamping station and to a suction cup robot which drops them in the completion bin. The current quality control process for stamping tops of pillboxes is inefficient.

Mechanical Engineering & Electrical Engineering (2)

Pressurized Ballistic Cylinder

Presenters: Adam Goblish, Lincoln Hahn, Justin Larson.

Advisors: Fereidoon Delfanian, Donell Froehlich, Robert Fourney, David Galipeau, Ali Manesh.

Sponsors: American Science and Technology Company, SDSU.

Description: To design and build a test platform for a pressurized ballistic cylinder fatigue sensor that closely simulates the operating conditions of both an individually pressurized cylinder and a multipressurized cylinder.

Formula SAE Vehicle

Presenters: Trent Johnson, Dan Dohman, Chris Williams, Eric Jones, Morgan McNickle, Kent Olsen, Dan Habeck, Keith Haggerty, Dan Lewis-Coomes.

Advisors: Don Froehlich, Dennis Helder, Shawn Duan, Jim Behnken, Dave Quale.

Sponsors: SDSU Student Association, College of Engineering, Departments of Mechanical Engineering & Electrical Engineering.

Description: Formula SAE is a student design competition in which students design, build, and compete with a formula-style race car. It has grown into six different competitions held around the world and provides engineering students with valuable group-based design experience that allows the application of

classroom knowledge to real-world engineering problems.

Agricultural and Biosystems Engineering (4)

Excavator Track Hydraulic Horsepower Test Fixture

Presenters: Gary Engel, Ted Boomsma, Jeremy Halgerson, Mike Lynch.

Advisor: Mylo Hellickson.

Sponsor: Bobcat, Bismarck, North Dakota (Johathan Roehrl).

Description: To design and develop a test fixture that can measure the hydraulic power required to drive a compact excavator track.

Redesign of Bobcat Tiller Attachment

Presenters: Andy Carlson, Tom Dressel, Reid Formo, Brett Hofer.

Advisor: Mylo Hellickson.

Sponsor: Bobcat, Litchfield, Minnesota (Matthew Kettner).

Description: Bobcat skid steer loaders have overcome the structural capabilities of the keeper assemblies and tines. The effect is the failure of the tines and excessive wear on the tines and keeper assembly. The project is to improve life of the tines, improve wear on the keepers, and reduce design complexity, while having minimal cost impact.

Sprayer System for John Deere Gator

Presenters: Lindsey Johnson, Jeff Beranek, Zach Heidenreich, Jesse Devine.

Advisor: Mylo Hellickson.

Sponsor: AgSense, Huron (Mel Wieting).

Description: The design of a fully automated sprayer for farm, golf course, city, and commercial use. The sprayer will be designed primarily for use on a John Deere Gator ATV. The design involves the entire sprayer system including tank, booms, pumps, and controls.

Wireless Planter Monitor

Presenters: Adam Dittbenner, Allen Meyer, George Sees, Jon Wiedemann, Justin Eggers.

Advisor: Mylo Hellickson.

Sponsor: AgSense, Huron (Mel Wieting).

Description: The development of a wireless planter monitor that will allow precision seed placement. Going wireless will eliminate problems typically associated with wiring harnesses and allow remote control monitoring. The project will require integration

of seed sensors, GPS, and wireless communication.

Engineering Technology & Management (10)

ProTour Jig

Presenters: Brooks Reidel, Peter Tollefson, Patrick Lyon, Arnold Frye, Wes Dugstad.

Advisor: Jerry Visser.

Sponsor: Daktronics (Peter McMahon).

Description: To design and build two ergonomic and efficient production Jigs for ProTour module assembly.

Portable Wireless Camera

Presenters: Kirk Jensen, Craig Shaw, Jesse Rounds, Mark Oelkers.

Advisor: David Mathews.

Sponsor: Matt Asche.

Description: To design, implement, and write a business plan to sell a multiuse wireless camera and monitor system.

Supplemental Solar Heat Box

Presenters: David Buechler, Brad Olson, Darrin Eihacker, Jay Kleinjan.

Advisor: Jerry Visser.

Sponsor: Harlan Olson.

Description: To design and build a system that captures solar energy and turns it into heat energy to supplement a machine shop main heating system.

Heated Mouse

Presenters: Andrew Gorder, Andrew Licht, Jason Dabbert.

Advisor: Mark Sternhagen.

Sponsor: Byron Garry.

Description: To design, build, and develop a business plan to sell a heated optical mouse that provides increased comfort to the user.

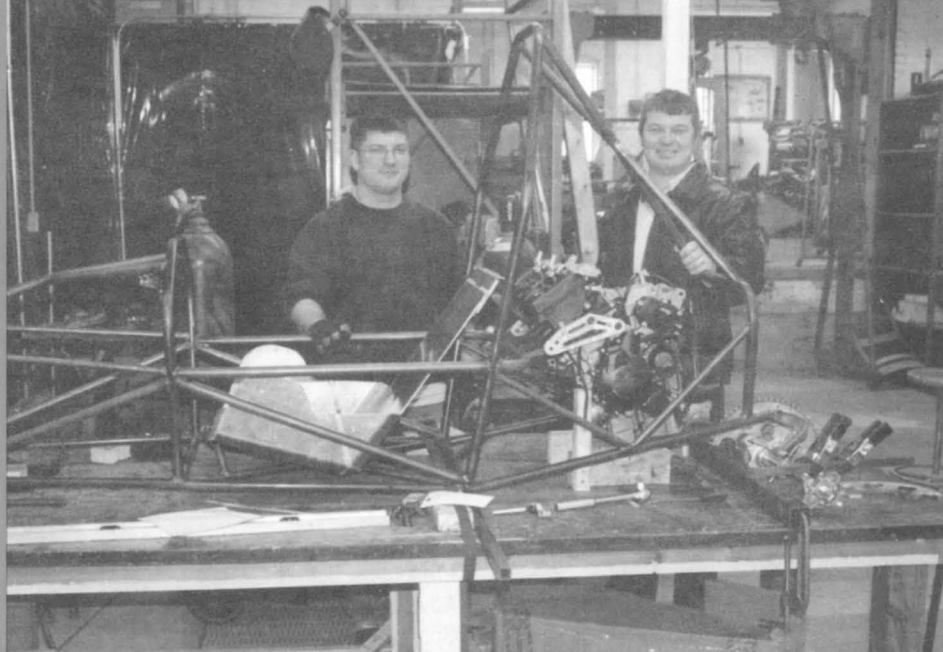
Electronically Controlled Quick Attach (three-point hitch)

Presenters: Matt Gregg, Chris Gubbels, Adam Gewerth, Matt Rosauer.

Advisor: David Mathews.

Sponsor: Gubbels Dairy Farm.

Description: To design, build, and write a business plan to sell an electronic three-point hitch system that is controlled from inside the tractor.



Trent Johnson, left, and Eric Jones pose with the Formula SAE Vehicle they are building with seven other mechanical and electrical engineering students. The goal is to have the vehicle ready for the Formula SAE (Society of Automotive Engineers) competition June 13-16 in Fontana, California. Formula SAE is a competition in which students design, build, and compete with a formula-style race car.

Digital Flow Meter

Presenters: Tyler Muser, John Carlson, Tom Foerster, Charles Raml.

Advisor: Byron Garry.

Sponsor: Dakota Beverage (Steve Foerster).

Description: To design, build, and write a business plan to sell a system that will convert a refrigerator into an active beer-dispensing tap with an accurate flow meter.

UPC Part Location System

Presenters: Bruce Hart, Jason Page, Zach Dawson, Matthew Leopold, Elizabeth Baca.

Advisor: Carrie Steinlicht.

Sponsor: Daktronics (Brandon Leen).

Description: To design and implement a barcode scanner system to locate missing parts from the assembly area before shipment of a project.

Engine Performance Maximization

Presenters: Tyler Laleman, Jeff Carstensen, Blake Hoffman, Brian Davis.

Advisor: Harvey Svec.

Sponsor: Sode's Performance.

Description: To build a Chevy engine that runs on E-85 and satisfies the customer's requirements for a good efficiency/performance tradeoff.

Online Business Servicing Used Electronic Devices – X-Boxes

Presenters: Rick Rosik, Koang Mot, Abdigani Wardere.

Advisor: David Mathews.

Sponsor: Byron Garry.

Description: To design a business plan, including the troubleshooting and repair guidelines, to modify and refurbish used X-Boxes.

Microphone Packaging

Presenters: Micah Ascano, Sarah Christensen, Bradley Vostad, Jeff Boddicker.

Advisor: Jerry Visser.

Sponsor: Theater Solutions (Corey Shelsta).

Description: To develop, build, and write a business plan to sell a waterproof, cushioned, ergonomic microphone protection system.

Mechanical Engineering, Engineering Technology & Management, Electrical Engineering (1)

Wrist Proprioception

Presenters: Reuben Flesner, Enes Kadic, John Isenberg, Yonas Mekonen.

Advisors: Lewis Brown, Donell Froehlich, Huitian Lu.

Sponsors: SDSU, Carol Wake, Scott Pedersen; Mayo Clinic, Richard Berger, Kenton Kaufman, Krista Coleman Wood, Matthew McCullough; Duane Morrow; Paul Kane; Kathie Bernhardt; Diana Hansen; Larry Berglund; Fred Schultz; Barb Iverson.

Description: Proprioception is the ability to detect movement and position of a human body part. The project involves a research effort of the Motion Analysis Lab (Mayo Clinic) to study the proprioceptive role of mechanoreceptors as well as the anterior and posterior interosseous nerves in the human wrist.

Senior Design Conference

Civil & Environmental Engineering (2) West Virginia University Scoreboard Design and Installation

Presenters: Chris Behrens, Krystle Benson, Zach Gutzmer, Mike Merron, Chad Stripling.
Advisor: Nadim Wehbe.
Sponsor: Daktronics.

Description: The design of the supporting structure and footings for a football scoreboard and video display to be installed at Mountaineer Field on the campus of West Virginia University. The scoreboard has already been designed and its specifications have been determined by Daktronics.

Westwood Valley II Development

Presenters: Brian Guldán, Brian Knadle, Andy Frey, Mike Cunningham, Toby Sunderland.
Advisor: Delvin DeBoer.
Sponsor: Jon Schmidt, Civil Design.

Description: Developer RBD Homes is looking to develop about ninety acres west of Sioux Falls. The design will accommodate single- and multi-family housing. There will be an area of small business and commercial facilities that will sit adjacent to two major roads. The design must not only be profitable with aesthetic appeal, but meet standards that are required in commercial and residential areas.

Electrical Engineering & Computer Science (9)

Low Cost Phase Measurement Profilometer

Presenters: Cody Anderson, Ross Faber
Advisors: Songxin Tan.
Sponsor: Songxin Tan.

Description: To design a low cost phase measurement profilometer that can be used to measure the profile of a diffusion object. The system consists of a digital projector, a digital camera, and a graphical user interface (GUI) that controls the measurement.

A Powerline Carrier Communications System for Coordination of Distributed Energy Resources

Presenters: Austin Hoekman, Robert Haar, Riley Hansum.
Advisors: Michael Ropp.
Sponsor: Michael Ropp and the Center for Power Systems Studies.

Description: To design a system that uses power line carrier communications to coordinate the activities of multiple, small distributed energy resources connected to a

power system. It would enable optimal use of photovoltaic, wind, small hydro, battery, and small generator resources in combination, ultimately enabling both a more sustainable and reliable power system, and one day be more economical as well.

RoHS-Compliant Single Board Computer

Presenters: James Galipeau, Sara Venhuizen.
Advisor: Andrew Jacobson.
Sponsor: Midwest Micro-Tek.

Description: The redesign of a single-board computer to be RoHS-compliant. RoHS is an environmental directive adopted by the European Union to reduce the amounts of certain materials in electrical and electronic equipment. The single-board computer is not currently RoHS-compliant. The proposal is to replace all noncompliant components on the board with compliant components.

Pressurized Cylinder Fatigue Sensor

Presenters: Russel Halgerson, Brian Odens.
Advisors: David Galipeau, Fereidoon Delfanian.
Sponsor: Ali Manesh and American Science and Technology.

Description: Frequent use and inadequate maintenance of pressurized cylinders can result in a gradual deterioration of the cylinder structure. This greatly increases the risk of dangerous explosions or other structural damage. To reduce this risk, a fatigue sensor will be designed to record the number of times a cylinder has been pressurized. This data can then be analyzed to determine the operating status of the cylinder so that it can be replaced before dangerous incidents occur. The project plan of action includes design, test, and integration phases.

Electronic Cardiac Arrhythmia Signal Generator

Presenters: Daniel Morstad, Pablo Montes Moreno.
Advisor: Lewis Brown.
Sponsor: College of Engineering.

Description: The design of a handheld device capable of producing both a low level and a high level analog electrocardiographic signal. A successful project will fabricate an easy to use, handheld electronic device that can be used by electrical engineering faculty and students at SDSU for research and educational purposes.

LED Backlight

Presenters: Nick Bowers, Michael Iseminger.
Advisor: Cory Mettler.
Sponsor: OEM Worldwide.

Description: LCD panels use one or more fluorescent tubes to supply the backlight to view information displayed on the screen. The fluorescent tube supplies an even and consistent bright white light, but the tube is fragile and prone to breaking in environments with high vibrations. The project is to design a robust replacement of the fluorescent tube in a LCD display with a design using LEDs.

Scoreboard Signal on a Powerline

Presenters: Curt Greenfield, Travis Haselhorst.
Advisor: Steven Hietpas.
Sponsor: Daktronics.

Description: The Daktronics all-sport console has traditionally used a signal wire or a radio transmitter to communicate with a scoreboard. For some situations, these methods are not practical. For this project, power line communications will be utilized to offer an additional cost-effective method of data transmission.

Data Acquisition System for E-85 Fueled Formula One SAE Car

Presenters: Keith Haggerty, Daniel Lewis-Coomes.
Advisors: Dennis Helder, James Behnken, David Quale.

Sponsor: Society of Automotive Engineers.
Description: The project is part of a larger project involving the design, building, and operation of a competitive race vehicle. A data acquisition and recording system will be designed and installed on the vehicle to maximize performance over a variety of conditions and demands.

Wireless Referee Pager

Presenters: Joseph Lueth, Aaron Kleinsasser.
Advisor: Andrew Jacobson.
Sponsor: Daktronics.

Description: The design of a wireless pager to alert referees to the end of match time. The pager will interface with current Daktronics hardware and will contain functionality for vibrational alert, audio alert, user-changeable communication channel, and an LCD display for game time. The pager will have a 200-foot range for use in indoor basketball and wrestling events.

Kyle Johnson

News



Shanzhong Duan, an assistant professor in Mechanical Engineering, received a 2006 Governor's Individual Seed Grant of \$47,060 for work on Effective Computer Simulation of Multibody Dynamic

Systems.

He also received grants totaling \$33,510 for work on Virtual Prototyping of Space Vehicles. The funding came from SDSU New Ideas (\$2,510), SDSU Research Start-Up Funds (\$5,500), South Dakota NASA EPSCOR (\$25,500).



Zhong Hu, an assistant professor in Mechanical Engineering, received \$23,115 in funding in 2006 for his work on Mechanical Modeling of Spectral Up-Conversion Materials for PV Devices. The dollars were split

between the SDSU Research Support Fund (\$5,115) and EPSCOR (\$18,000).



MaryJo Benton Lee, coordinator of the SDSU-Flandreau Indian School Success Academy, was given the Allies in Indian Education Award at the Dakota Oyate Challenge tournament at the Convention Center in Huron January

25. The award is given to people who demonstrate a strong and sincere commitment to American Indian education.

The SDSU-FIS Success Academy began in 2000 as an early and intensive college

preparatory program for Native American high school students. The academy brings students to SDSU at least fifteen times during the course of their high school years for hands-on workshops in all seven of SDSU's academic colleges. Now in its seventh year, more than a thousand American Indian students have been served by the program.

On June 1, 2006, Benton's second book — *Ethnicity Matters—Rethinking How Black, Hispanic, and Indian Students Prepare for and Succeed in College* — rolled off the presses at Peter Lang Publishing.

The 160-page paperback focuses on four model programs that are highly effective in preparing students from underrepresented groups for college and in supporting these students through baccalaureate degree completion.



Professor **Alex Moutsoglou**, Associate Professor **Kurt Bassett**, and Instructor **Mike Twedt**, all in the Department of Mechanical Engineering, are doing work with the SDSU Sun Grant Institute, which is

receiving \$150,000 annually for research work.

The annual Mechanical Engineering share is \$55,000 plus an \$11,000 match for a total of \$264,000 in four years.

The trio is working on two tasks as part of an interdisciplinary group exploring the development of a prairie biorefinery.

The first task involves engineering systems analysis of production, delivery and processing of new ethanol feedstocks. The second task will focus on identifying an optimum thermochemical process to convert new feedstocks to biofuels.



Christopher Schmit, an associate professor in Civil and Environmental Engineering, began a three-year term on the Water Environment Federation Board of Trustees.

He is the first South Dakotan to serve on the board, which is the fiduciary body of the 35,000-member organization. Schmit, who has been a federation member since he was a graduate student in 1991, served as a director from the South Dakota Water Environment Association in 2005-06. Now he is one of sixteen trustees.

Schmit, who has taught at SDSU since January 1998, also has served as president of the South Dakota Water Environment Association.



Instructor **Mike Twedt** is a collaborating senior investigator with the 2010 Center for Bioprocessing Research and Development, which is headquartered at the South Dakota

School of Mines.

The center was formed in July 2006 by Governor Mike Rounds to focus on research that leads to new technologies for processing plant-derived materials into biomaterials such as ethanol and key building block chemicals. It received first-year funding of \$500,000.

Twedt is a lead investigator in the economics portion of the project, focusing on process scale-up and commercialization.

There are eighteen investigators in fields ranging from chemical engineering to microbiology.

New FACULTY

Seong-Tae Jhang is a visiting professor in the Electrical Engineering and Computer Science Department. He is an associate professor in the Computer Science Department at Suwon University, Gyeonggi-do, South Korea, and an editorial board member in the Internet Information Association, Korea. He received his bachelor's, master's, and doctorate in computer engineering from Seoul National University.



Paula Kurtenbach, a full-time instructor in the Electrical Engineering and Computer Science Department, is teaching computer science. She received her education at SDSU with a bachelor's degree in electrical

engineering and mathematics and a master's degree in engineering with the emphasis in computer science. Kurtenbach has been serving as the distance teacher with the DIAL ILC Project in Flandreau.

Beth Malsom is a safety and health consultant with Engineering Extension in the Engineering Resource Center. She has a bachelor's degree in agricultural systems technology with the environmental option and a bachelor's degree in chemistry from SDSU.



Manki Min, assistant professor in the Electrical Engineering and Computer Science Department, is teaching computer science. Min received his doctorate in computer science and information

sciences from the University of Minnesota and has been serving as a postdoctoral research associate at the University of Florida.

William Mincks is an assistant professor in the Engineering Technology and Management Department, teaching construction management. Mincks received his master of arts in architecture from the University of Idaho and comes here from Pullman, Wash., where he has been working as a construction consultant.

Donald Vestal, assistant professor of mathematics in the Mathematics and Statistics Department, comes from Missouri Western State University, where he was an associate professor. Vestal received his doctorate from the University of Colorado in Boulder.

Sharon Vestal is an assistant professor in the Mathematics and Statistics Department. She has been serving as an associate professor of mathematics at Missouri Western State University after receiving her doctorate from the University of Colorado at Boulder.

Erin Ulvestad is an instructor in the Mathematics and Statistics Department. She worked as a graduate teaching assistant in math at SDSU while receiving her master's degree.



Hesham Mahgoub, assistant professor of Civil & Environmental Engineering, comes from the University of Central Florida in Orlando, where he served as a researcher with the Center for Advanced Transportation

Systems Simulation and director of the Surveying Lab. He received his bachelor's, master's, and doctorate from Cairo University in Egypt.

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SOUTH DAKOTA STATE UNIVERSITY FOUNDATION



A distinguished group

Achieving distinguished honors doesn't require membership in the Grecian Formula Club.

In fact, among the ten people honored in 2006 by the SDSU Alumni Association as distinguished alumni, three hail from the College of Engineering and all are relatively recent graduates.

Those gaining accolades on October 27: Jill LaPlante '93, electrical engineering; Kathryn Walker '81, civil engineering; and Justin Williams '95/'96, mechanical engineering/engineering physics.

In April 2006, the list of Distinguished Engineers grew to 112 when James Mentele '66/'67 math/physics, and Loren Wagenaar '65, electrical engineering, were added.

A summary of each honoree follows.

James Mentele
Distinguished Engineer



Mentele attended SDSU as a Briggs scholar. After graduation he went to work for Dow Corning as a mathematician in Midland, Michigan.

He obtained his master's degree under George Duffey and returned to Dow Corning as a physicist. He worked

at Dow Corning in various research and information technology positions, retiring in 2001 as a senior information scientist and continues as a scientist emeritus.

In 2001, he started Teos, Inc., as a consultant in text and data mining and mathematical modeling. He continues to also spend time as senior research fellow at the Central Michigan University Research Corporation and with Global Language Translation and Consulting as a director.

He and his wife JoAnn (Eichacker) have three children.

Loren Wagenaar
Distinguished Engineer



Wagenaar headed for Sharon, Pennsylvania, after graduation, working as a transformer development engineer at the Westinghouse Electric plant.

During his stay in Sharon, he married Marilyn Buck in 1968 and obtained

a master's degree in electrical engineering from Akron (Ohio) State University.

In 1968 they moved to Muncie, Indiana, where he worked fourteen years as a development engineer on transformer insulation systems and electrical bushings up to 1,100 kV.

He obtained a master's degree in math from Ball State University in 1973.

In May 1982, Wagenaar joined American Electric Power in Columbus, Ohio, where he is responsible for all aspects in the procurement of power transformers, shunt reactors and instrument transformers, all with voltages ranging to 765 kV.

Jill LaPlante
Distinguished Alumna



Whether it is volunteering at the middle school or making a major contribution to the Hillcrest Aquatic Center, Jill LaPlante and her husband, Don Endres, demonstrate the value of community involvement.

For helping to build the foundation for a stronger community, Endres and LaPlante were honored for Outstanding Service to Home Community.

LaPlante earned her bachelor's degree in electrical engineering with minors in math and economics in 1993. Endres earned a bachelor's degree in animal science in 1983, with minors in computer science and economics.

LaPlante is a stay-at home mother who is a PTA helper and volunteers at Mickelson Middle School and Medary Elementary School. The SDSU graduates have lived their entire married life in Brookings.

Kathryn (Waples) Walker
Distinguished Alumna



Walker, who was inducted as a Distinguished Engineer in 2005, has seen the bars on her career chart climb rapidly.

She has gone from supervising telephone line

construction for Wisconsin Bell in her first job after graduation to becoming the chief network officer at Sprint Nextel, putting her among the highest-ranking female corporate executives in the communications industry.

The Alumni Association honored her with the award for Outstanding Professional Achievement.

After nearly three years at Wisconsin Bell, she moved to U.S. Telecom, which became Sprint, which now is Sprint Nextel.

Walker leads the overall planning, designing, and operations of Sprint Nextel's wireless and wireline networks.

Walker and her husband, Mark, originally from Trenton, Mo., live in Olathe, Kan., with their three Brittany spaniels.

Justin Williams
Distinguished Alumnus



Williams, an assistant professor in the departments of Neurological Surgery and Biomedical Engineering at the University of Wisconsin-Madison, has focused his research efforts on designing brain implants that will advance the

treatment of neurological disorders such as Lou Gehrig's disease.

Williams graduated summa cum laude from SDSU. He continued his education at Arizona State and earned a master's degree and doctorate in bioengineering in 2001.

Williams then received a dual postdoctoral fellowship at Wisconsin-Madison and the University of Michigan.

The Alumni Association presented Williams with the Distinguished Young Alumnus Award.

He is among twenty new clinical research leaders nationwide that the National Institutes of Health has selected to help in accelerating medical discoveries.

Williams resides in Madison with his wife Angela.

News

Lt. Col. **Thomas Croymans** '85, civil engineering, assumed command of the 88th Troop Command with the South Dakota Army National Guard November 4, 2006.

Croymans, 48, of Aberdeen, is a native of Milbank and has served in the Guard since October 1975, both in enlisted and commissioned service. Prior to taking the Brookings position he was defense movement coordinator for the South Dakota Guard, based in Rapid City. In his day job, Croymans is a civil engineer with the Bureau of Indian Affairs.

David E. Holman '71/'72, civil engineering, was promoted in summer 2006 to the rank of brigadier general and assumed the position of chief of staff with the South Dakota Air National Guard in Sioux Falls.

Holman, a Canistota native who now lives in Rock Rapids, Iowa, began his Air Force career in 1971.

In his new job, he oversees the headquarters that supports the Air Guard base in Sioux Falls as well as the 114th Fighter Wing there. He had been serving as commander of the 114th Mission Support Group of the South Dakota Air Guard.

Previous positions include base civil engineer and commander of the 114th Civil Engineering Squadron.

Carrie Hruska '02, electrical engineering, received the \$10,000 P.E.O. Scholar Award for the 2006-07 academic year.

Hruska, of Madison, is a doctoral student in biomedical engineering at Mayo Clinic College of Medicine in Rochester, Minnesota.

In her doctoral research, she is to develop and optimize a new nuclear medicine technique to image breast cancer. With molecular breast imaging the accumulation of a radio-labeled drug or

DEAN'S CLUB

The Dean's Club is comprised of graduates and friends who gave \$250 or more to the College of Engineering from January 1 through December 31, 2006.

Support from alumni, corporate donors, and friends has come to be essential to institutions of higher education. Contributions have made possible the development of activities that have won recognition for the SDSU College of Engineering as one of the nation's leaders in engineering education. We have benefited, and those who have been generous in their gifts share with us the satisfaction that comes from achievements of our faculty and students.

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tracer is preferentially taken up in breast tumors and recorded with a gamma camera.

The new method is needed for women who are not served well by traditional mammography, including those with dense breast tissue.

Changing Our World: True Stories of Women Engineers includes a profile of **Carol Lehtola '71**, the first female graduate of SDSU's Department of Agricultural Engineering.

The book was released during National Engineers Week in 2006. It was

written by Sybil Hatch and produced by the Extraordinary Woman Engineers Project, an effort by more than fifty organizations to encourage young women to pursue engineering careers.

Lehtola, an associate professor in the Department of Ag and Biological Engineering at the University of Florida, is profiled for her efforts to reduce deaths due to tractor rollovers, the most common cause of farm deaths.

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 Dennis J. Pohl
 Gregory L. Pohl
 Stephen H. and Kathryn M. Pohl

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 Jerald D. Polly
 Mark S. Pool
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 Bernard E. Poppenga
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 Steven J. and Shirley A. Quail
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 Harlan J. and Janice E. Quenzer
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 Girish V. Reddy
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 Pete and Betty Reeve
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 Douglas P. Reimnitz
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Banner employees sponsor ten JRG scholarships

Ten employees at Banner and Associates created ten named \$1,000 Jackrabbit Guarantee Scholarships, initially with a little help from a friend.

In early September 2006, the ten employees each contributed \$250, which Banner matched. The other \$500 came through the SDSU Foundation, from a pool of money created for just that purpose and available for three years.

"It's an opportunity for our employees to get involved at a reasonable amount," says Denny Micko, president of Banner and Associates. "If they want to continue to support the named scholarship in three years, they'll have to bear the entire cost. Of course, we hope that in three years they will be in a position to do that."

Charles P. and Mary J. Remund
 Rob C. Renner
 Dean A. and Laura J. Rennich
 Lyle P. Renz
 Maynard M. Resen
 Richard A. Reynolds
 Guy F. Rhoades
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 Dennis L. Richards
 Duane J. Richter
 Gerhard W. Richter
 Thomas G. and Ann P. Riebel
 Darwin A. and Mary J. Rieck
 Harold P. Rieck
 Thor S. Riedesel
 John A. Ries
 Jon A. and Cheryl K. Rippke
 Sarah E. Rippke
 Fred J. and Ardyne M. Rittershaus
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 Thomas N. Roe
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 Jeff M. Rogers and Anya D. Hartpence
 Aaron N. Rogness
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 Dwayne A. and Helen L. Rollag
 Edward J. and Roseann R. Roman
 Rosebud Concrete
 Warren E. and Patricia L. Roske
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 James R. and Kathryn A. Roskens
 Thomas R. and Lynne E. Roth
 Michael D. and Patricia A. Roth
 Robert J. and Peggy Roth
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 Gregory L. and Lauri J. Rothschild
 Michael L. and Lisa D. Round
 Kenneth A. and Mary Margaret Rowen
 Thomas E. and Loretta L. Rowley

Maurice D. Ruch
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 Timothy A. Ruggles
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 Rushmore Electric Power Coop., inc.
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 Garret D. and Jane M. Sarkinen
 Jamal B. Sarsam
 Mumtaz B. and Vivian M. Sarsam
 John C. Sater
 Van J. and Theresa M. Sattlak
 Dennis F. Satterlee
 Harlow L. Sauder
 Gwen K. Sauer

DONATIONS BY YEAR TO ALL ENGINEERING ACCOUNTS

(figures are hard dollars received in each year)

Year	Count	Amount
1997	3146	\$2,335,024.67
1998	3004	\$1,384,527.83
1999	3007	\$1,095,310.55
2000	2701	\$1,182,779.48
2001	2778	\$1,706,077.99
2002	2665	\$1,341,832.78
2003	3424	\$1,197,203.62
2004	3483	\$ 790,894.85
2005	3438	\$1,616,234.22
2006	3520	\$1,253,628.88

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 Richard W. Sawrey
 Thomas R. Saxon
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 Richard F. Sayre
 William H. and Clarann Sayre
 Timothy G. Schaal
 Vernon R. and Ruth A. Schaefer
 Samuel W. Schaefer
 Chad W. and Molly A. Schaeffer
 Marvin J. and Jean Schaeffer
 Bill K. Schaphorst
 Myron K. Scheibe
 Darren M. Schelske
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 Schering-Plough Foundation Inc
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Noel J. and Jennifer A. Schulz
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 Alan J. and Diane M. Stoick
 Tenison A. Stone
 Clayton L. and Mary E. Storley
 Joshua J. and Jill M. Storm

RESEARCH FUNDS

	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006
College							
Ag. & Bio.	\$6,359,978	\$10,040,384	\$6,900,181	\$7,026,598	\$9,711,621	\$10,653,789	\$11,129,144
Arts & Science	\$269,718	\$1,092,149	\$725,696	\$572,153	\$727,263	\$401,002	\$620,638
Education	\$244,136	\$133,060	\$299,755	\$195,232	\$197,751	\$186,893	\$388,359
Engineering	\$2,091,396	\$2,346,892	\$2,895,234	\$2,395,493	\$2,690,655	\$2,784,142	\$3,449,526
Fam. & Cons. Sci.	\$552,430	\$501,386	\$746,878	\$802,454	\$867,660	\$1,304,763	\$1,361,511
Nursing	\$535,217	\$345,583	\$379,383	\$330,625	\$405,766	\$771,691	\$1,529,430
Pharmacy	\$86,464	\$259,593	\$22,200	\$218,243	\$25,116	\$84,309	\$557,962

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Charles G. Voelker
Anthony T. Voell
Vernon P. and Cathrene M. Voelzke
Joseph P. Vogel
David A. Vosika
Brian P. Vrchota
David C. and Shantelle L. Wade
Richard A. and Elizabeth A. Wadhams
Loren B. and Marilyn A. Wagenaar
Charles L. Waggoner
Elly Jo B. Wagner
Randy L. and Theresa A. Wagner
Robert J. Wagner

Graduates from the College of Engineering by Discipline for last 10 years

From July 1 through June 30

YEAR	ABE	CEE	CSc	CM	EE	EET	E MATH	PHYS	IM	MNET	ME	SAFM	SE	College Totals
2005-06	14	41	10	19	27	14	7	0	2	12	31	0	0	177
2004-05	6	31	9	17	26	18	0	1	2	14	25	0	0	149
2003-04	9	18	18	23	24	12	0	2	2	13	28	0	0	149
2002-03	12	33	18	23	23	26	0	6	0	13	40	0	0	194
2001-02	8	36	10	27	38	12	0	1	0	11	38	0	0	181
2000-01	13	40	13	22	18	9	0	2	0	12	41	0	0	170
1999-2000	11	41	15	23	21	14	0	7	0	10	36	0	0	178
1998-99	5	51	17	21	32	19	0	8	0	3	27	0	0	183
1997-98	7	39	22	14	36	19	0	3	0	0	43	0	0	183
1996-97	12	48	15	3	27	19	0	3	0	0	43	0	0	170
	97	378	147	192	272	162	7	33	6	88	352	0	0	

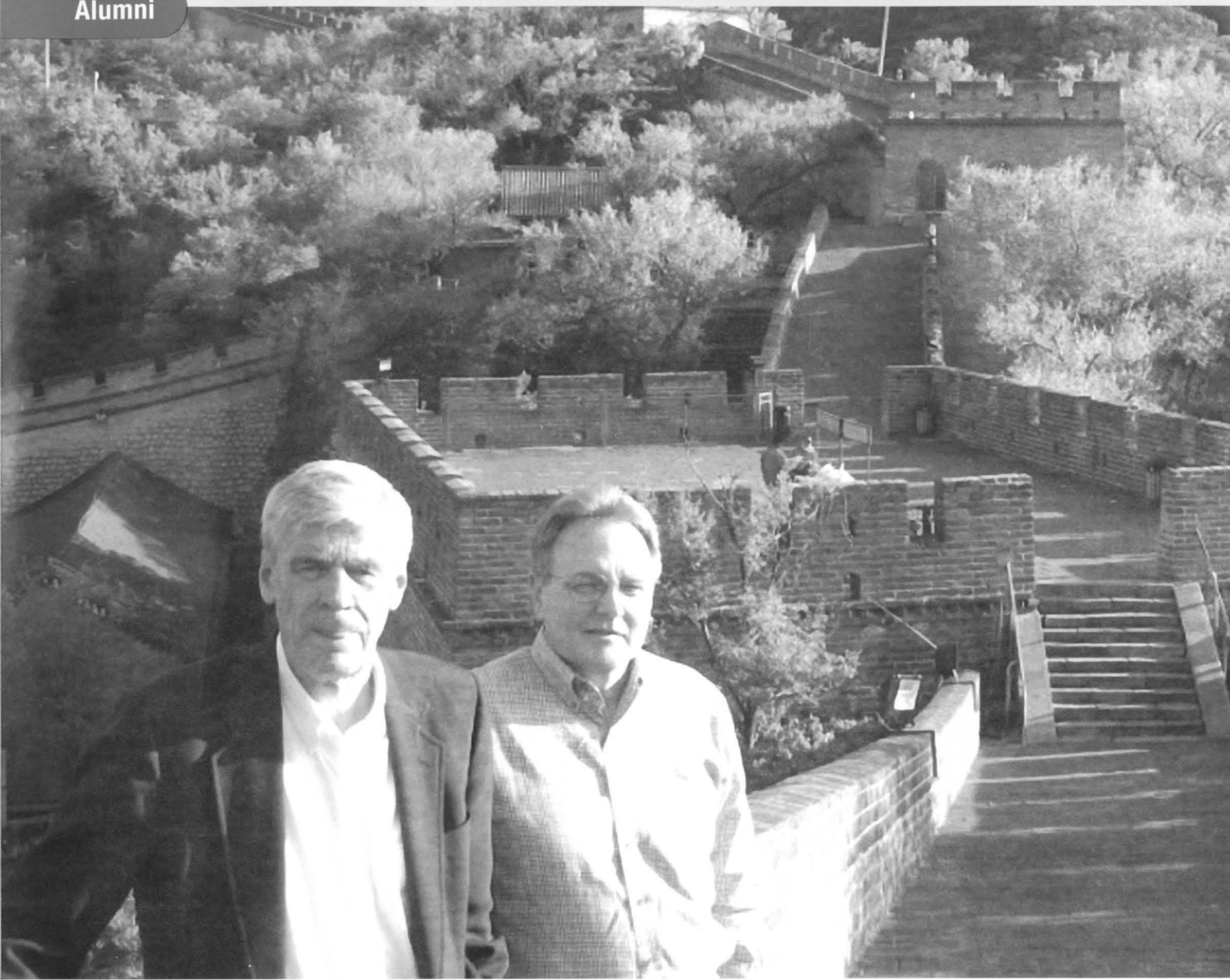
- | | | | |
|-----------------------------------|--|--|--------------------------------------|
| Ryan P. and Kerri A. Wagner | David L. Weisz | Diane M. Wilaby | Xcel Energy-Minneapolis |
| Kathryn and Harold Dawson | Mark J. Weisz | Donald D. Wilaby | Zhanglong Xu |
| Donald G. Wahlstrom | Cameron C. Welbig | Archie D. and Ethel H. Wilcox | David P. and Joyce M. Yexley |
| Ramona Wahlstrom | Brett D. and Rachel K. Welch | James C. and Doniese M. Wilcox | Beverly D. York |
| Stuart A. Wahlstrom | Alfred G. Wellnitz | Jack W. Wild | Dennis J. York |
| David J. Waldner | Wells Fargo Bank, NA | Robert A. and Ver Dell R. Wiles | John B. Young |
| Steve M. and Lisa A. Waldner | Bryan N. and Beth J. Wells | Paul C. and Susan R. Wilkens | Jo Etta D. Younger |
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| Fred J. and Teresa R. Wehling | Frank Wiersma | Mark M. Wright | |
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| Bob K. Weir | Charles R. and Kathryn H. Wieting | James W. and Harriett R. Wyland | |
| Mark M. and Ann K. Weismantel | A. Gerald Wigdahl | Leo J. Wylie | |
| Brian R. and Richel A. Weiss | Bradley W. Wiitala | Kenneth D. Wyman | |
| Larry L. Weiss | | | |

Enrollments in the College of Engineering by Discipline for last 10 years

Fall Enrollments

YEAR	ABE	CEE	CSc	CM	EE	EET	E MATH	GE	IM	MNET	ME	PHYS/EP	SAFM	SE	TOTAL
2006	71	257	98	187	147	80	64	74	18	72	293	25	1	31	1418
2005	78	228	83	155	142	73	44	43	13	70	284	25	0	27	1265
2004	70	212	101	124	160	69	12	47	5	74	276	31	0	16	1197
2003	79	181	120	116	175	74	0	70	3	57	263	26	0	9	1173
2002	70	185	154	94	161	82	0	92	0	56	251	27	0	0	1172
2001	61	161	164	104	177	83	0	94	0	59	244	23	0	0	1170
2000	60	189	163	99	177	64	0	68	0	53	225	18	0	0	1116
1999	63	216	150	94	168	57	0	49	0	49	243	22	0	0	1111
1998*	64	193	165	102	128	61	0	206	0	33	185	25	0	0	1162
1997	53	240	136	87	177	64	0	52	0	20	247	21	0	0	1097
1996	51	267	114	53	162	74	0	56	0	1	241	14	0	0	1033

*Pre-Engineering majors were included with GE majors



Richard Bue

CE alum prime example of engineering versatility

Richard Bue is a perfect example of how versatile an engineering degree can be.

After Bue graduated from State in 1953 with a civil engineering degree, he worked for a few years on a joint venture between Western, Massman, and Jones construction companies building the dam and powerhouse at Yankton on the Missouri River. After that, he worked for a year at Lockheed Aircraft in Burbank, California.

Then it was on to Minneapolis, where he joined Sico, a worldwide manufacturer of multiuse of space equipment. He's been there fifty years.

"The job I have would typically be held by a mechanical engineer," Bue says. "There's not a good explanation for it other than that's just the way it worked out. Why did a civil engineer get hired

“When you have an engineering background, this covers a rather broad area. I’ve hired a number of engineers and I was not too hung up on which engineering degree they had. If they had an engineering background and ambition, the rest of it was training.”

Richard Bue

by Lockheed? Because they needed engineers. It doesn’t make a heck of a lot of difference because when you have an engineering background, this covers a rather broad area.”

Background, ambition

Bue carries that philosophy through when bringing new people into the company.

“I’ve hired a number of engineers and I was not too hung up on which engineering degree they had. If they had an engineering background and ambition, the rest of it was training. That’s not as true with the exotic areas like physics or chemistry, but the other engineering areas overlap.

“Sico doesn’t deal with high tech products. It’s not like designing computers or space shuttles. If you have some creative imagination, things work out.”

Sico has secured more patents than Bue can readily count, as well as awards for its work, though he is humble in accepting any personal responsibility.

“I work in product design,” he explains. “Certainly things get designed and are patentable. Sico creates portable institutional furniture, equipment that can be folded up and put away to allow for multiple use of space. All patents are related to the product.”

At age 78, Bue is still going strong, continuing to work full time. He attributes his stamina to good fortune and a farm family upbringing.

“I think it’s just good luck,” he says. “I was born and raised on a farm in South Dakota, near Sisseton in Roberts County. People with that kind of background tend to last forever.”

Uncle Marvin

Bue started college at the South Dakota School of Mines and Technology, where he attended for two years.

“Then I realized that in civil engineering, I could do as well in Brookings,” he says. “I had an uncle who was a civil engineering grad from South Dakota State, so I decided to make the switch.”

That uncle, Marvin Bue, was his primary influence toward civil engineering.

“When I was a young boy on the farm, we worked hard to make ends meet,” Bue recalls. “My uncle was an engineer and a naval officer. He was very good looking, with his fancy uniform and driving a fancy car—all the things a young person is impressed by.

“He was a good man, very strict, very demanding. We didn’t see him very often, but you were always on your best behavior when you talked to him. He commanded a lot of respect and a little fear—a good combination. He spent nearly his entire career in South Dakota, working for the federal government.”

Before he died, Marvin Bue established a scholarship at State. His nephew is, likewise, loyal to his alma mater.

“I give my yearly donations to scholarships and I’m loyal, certainly,” Bue says. “I think it was a great school when I went there and I’m sure it still is. I had some darned good instructors at State starting with Emory Johnson, who was the head of the Civil Engineering Department, and at Mines and at Sisseton High School. I was very fortunate in the quality of the teachers and instructors I had, almost without exception.”

50 years and counting

As vice president of operations, Bue’s role is to “coordinate engineering and manufacturing so we’re all following the same track. I’m a go-between between the owners and our affiliates.

Work that takes him all over the world—to Beijing, for example, where

Richard “Dick” Bue

Hometown: Family farm near Sisseton.

Education: Sisseton High School graduate who earned a civil engineering degree from State in 1953.

Current position: Vice president of operations for Sico, a worldwide manufacturer of multi-use of space products.

Family: Wife — Mary Ann. Three sons — Mark, the eldest, is an electrical engineer working for a software company in San Diego, California; Steve, the middle child, is an electrical engineer working as a process engineer for Multek Flexible Circuits, Inc., in Northfield, Minnesota; Dan, the youngest, is a pilot for Champion Air in Minneapolis. Two grandsons and one granddaughter. Says Bue: “Work is fine, but our grandchildren is what our life is about these days.”

To contact: dickbue@comcast.net

Sico’s partner recently built a new factory. Sico, Inc. is also the parent company of Sico America, Sico Asia, Sico South Pacific, Sico Europe, and Sico Japan.

“We’re international, so I do quite a bit of traveling,” Bue says. “It’s interesting work. I keep thinking about retiring, but I take it month by month. I always told everybody I wasn’t going to stick around fifty years, but here I am.”

Cindy Rickeman

OPPOSITE:

Dick Bue '53, left, and Jim Kline pose on the Great Wall in China May 17, 2005. Bue, 78, is vice president of operations for Sico. Kline, is vice president of operations for one of its subsidiaries, Sico America. Though Bue’s position would traditionally be filled by a mechanical engineer, his training was as a civil engineer.

Solar

Electrical engineering students
bring solar power to
Wrangell-St. Elias National Park
and Preserve in Alaska



From snowy mountain peaks to sandy, sun-soaked Hawaii, the sun never sets on the places SDSU students help bring solar power.

In July 2006, nine SDSU electrical engineering students did some class work against the mountainous backdrop of Wrangell-St. Elias National Park and Preserve in Alaska. And a 2008 trip to Hawaii Volcanoes National Park is in the planning stages.

The group made up part of a solar power, or photovoltaics, class, taught by Electrical Engineering Professor Michael Ropp. The class met during the spring 2006 semester to prepare for the July 16-22 work trip.

During the spring, students worked in groups to design a solar-power system for the park as their final project, said Ropp, who organized the trip. The summer students, ranging from juniors to recent graduates, installed the system with a design similar to the ones students created in the classroom.

"They knew this thing forward and backward," said Ropp, noting that some aspects of the final design differed due to costs and equipment. He called it "an ideal way to expose students" to real-world applications.

Nearly everyone uses solar power in Wrangell-St. Elias, according to Ropp.

"Solar is extremely reliable ... but it's relatively expensive," he said.

The cost per kilowatt-hour is \$1.30 with the system, which is high, he said. However, the system is only used from

May to September. "If you used it year-round, the energy cost would be much lower," he said. "Also, given the remoteness of the site and its location deep within a wilderness area, grid-based power simply isn't an option, and fuel costs are relatively high—relative to the rest of Alaska, that is, where fuel costs are in general extremely low."

In addition, parks face environmental concerns, which make providing power and preserving the environment "conflicting mission(s)," he said.

The Wrangell-St. Elias system provided power for appliances and lights in the cabins and facilities where the group stayed near the town of McCarthy, a town with a year-round population of about 100, Ropp said. No power system existed before the solar-power system.

"The communications setup was the main thing that we were powering," he said. The new solar system helped power cell phones and provided some first-time Internet access for the area.

Creating park partnerships

Despite daytime temperatures in the 70-degree range during their visit, Ropp said it takes special kinds of people to live in Wrangell-St. Elias.

"I thought we grew 'em tough in South Dakota," he said.

"I heard a story about a longtime McCarthy resident coaxing his car back to town on an icy night while running on a fan belt he'd had to make out of his

shoelaces when his own belt broke somewhere on the McCarthy Road.

"That brings up the subject of the winter—temperatures can dive to [minus] 60 degrees Fahrenheit, and for much of the year the sun never rises above the Chugach Mountains."

The largest national park in the United States, Wrangell-St. Elias contains only two roads, Ropp said, adding that from the group's location, "The nearest traffic light (was) about six hours away."

Ropp took students to Yellowstone in 2001 and 2004 to install solar-power systems. He began organizing the trips by calling national parks.

"I was trying to come up with some good solar experiences for the kids," he said.

From there, he discovered a niche for SDSU students to gain hands-on experience with solar power.

"We want these projects to be what the parks want," said Ropp, noting the class doesn't want to compete with industry. When choosing projects, he looks at parks that need funding.

"I've always done this on a project-by-project basis," Ropp said.

Both the park and SDSU provided funding for the Wrangell-St. Elias project, but the park provided much of the equipment, including cement footings for solar panels, Ropp said. The Electrical Engineering and Computer Science Department funded other necessary equipment, like batteries and other mounting materials. The Center for Power



Gathering in the Alaska wilderness are, front row, from left, Austin Hoekman, Jack Winter, Tonja Jorenby, and Curt Greenfield. Back row, Dustin Schutz, Jerad Johanssen, Doug Larson, Chris Mouw, and Riley Hassum.

Systems Studies at SDSU helped with travel expenses, he said.

Word has spread throughout the park system about the SDSU students' work, Ropp said, noting that ten students have gotten jobs thanks in part to connections developed through their summer trips.

"Hopefully, that's an indication of the value of the program," he said.

In addition to putting the solar-power system into place as planned, students had to assemble a mounting structure on site, Ropp said.

"The students did such a nice job," he said. "Everybody, *everybody* was in there pulling their weight."

"If I hadn't chosen to, I wouldn't have had to pick up a screwdriver."

'A dream come true'

"The Alaska trip was a dream come true," said Jack Winter, an electrical engineering graduate from Huron. "It was something I'll remember for the rest of my life."

Winter works as a communications engineer for the Western Area Power Administration in Huron. While he doesn't plan to work specifically with solar power, he said during Ropp's class he "really learned a lot about solar energy."

"We were able to put our experience in class to actual use in Alaska," he said.

"Using what Dr. Ropp had taught us, we were able to put (the system) together very easily."

Dustin Schutz, now an electrical engineering graduate student at SDSU, said the trip "was a once in a lifetime opportunity that I knew I couldn't pass up."

"Actually having to install all the parts in a system and adjust the settings on the electronics brought us full circle from design to implementation to system monitoring," Schutz said. "Seeing how things are installed and the issues that arise on the job site will improve my design decisions in the future."

While the students worked hard, they made time to explore the wilderness that had become their classroom.

"It's wonderland in superlatives," Ropp said. "There's just no way to describe it without seeing it."

"My favorite part was going for a ride in an airplane," said Winter, whose fascination with planes dates back to his childhood. He, along with seven other students, took a "flightseeing" tour.

"This tour was only thirty-five minutes, but we saw some very spectacular sights of glaciers, mountains and forest," he wrote in an e-mail. "One student even got to see a bear while we were flying."

"Another day was spent hiking on the Kennicott Glacier with crampons, a set of spikes which tie onto your shoes to allow a firm grip on the hard ice," he wrote. He estimated the glacier at about three miles wide, 300 feet thick and thirty miles long.

"We hiked around on the glacier and saw many wonders of the ice. A tour of the Kennicott copper ore mill followed. The park service is in the process of restoring this place and saving the history that is there for future generations to enjoy."

Beyond 'technical' education

While money is required to make the parks projects work, Ropp said, another resource is needed as well.

"You must have good people; you must have good students," he said.

"Ultimately, the thing that gives me the biggest charge ... is watching the students."

Schutz said, "The most rewarding part of the project was seeing a product that electrical engineers helped develop be utilized to improve the living conditions in that part of the park."

"Talking one-on-one with some of the locals and listening to their stories and experiences was also quite rewarding."

In addition to assembling the system, students must talk to customers, Ropp said.

"Not all the education (the students) get on this trip is technical," he said. He described helping others as a key component of engineering.

"For me, using science and technology to improve quality of life is what engineering is."

Denise Watt

Funds sought for Harding Hall South



By July, a 30,000-square-foot engineering building should begin emerging from the ground directly south of Harding Hall. The land has been cleared and the building's design will soon be finalized. The College of Engineering's stature continues to grow, with regional and national companies flocking to campus in search of the school's graduates.

The new building was born from space needs within the College, which this year added a doctorate in electrical engineering. It is the third doctoral program offered by the College. The others are computational sciences and statistics, and geospatial science and engineering.

The new building, which is estimated to cost \$6.5 million, will further enhance the College's ability to attract top students and faculty. The building could be occupied by fall 2008.

The engineering building will be funded entirely through private gifts. Naming opportunities within the building will be offered.

Four individuals with longtime connections to the College have spearheaded the effort, committing \$4.5 million toward the overall project. The SDSU Foundation is working with Dean Lew Brown and engineering faculty on the campaign to raise the remaining \$2 million.

The partnership between the College and the Foundation is designed to capitalize on these types of opportunities, according to Foundation President/CEO David Marquardt.

"This University continues to be enriched by generous donors and supporters who want to see South Dakota State move forward," Marquardt said. "They understand firsthand the College of Engineering's value to this University and the state of South Dakota, and they are willing to make a substantial investment to address the college's needs."

However, he said alumni and supporters of the College will need to step forward to make sure the project can proceed. "Private gifts made possible the renovation of Solberg Hall and the renovation and expansion of Crothers," Marquardt said. "We hope alumni will embrace this new, exciting project."

To learn more about the project and funding opportunities:

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Engineering Expo
co-chairs Aaron
Kompelien, left,
and Jon
Rauenhorst
prepare for the
April 27 event at
Frost Arena.