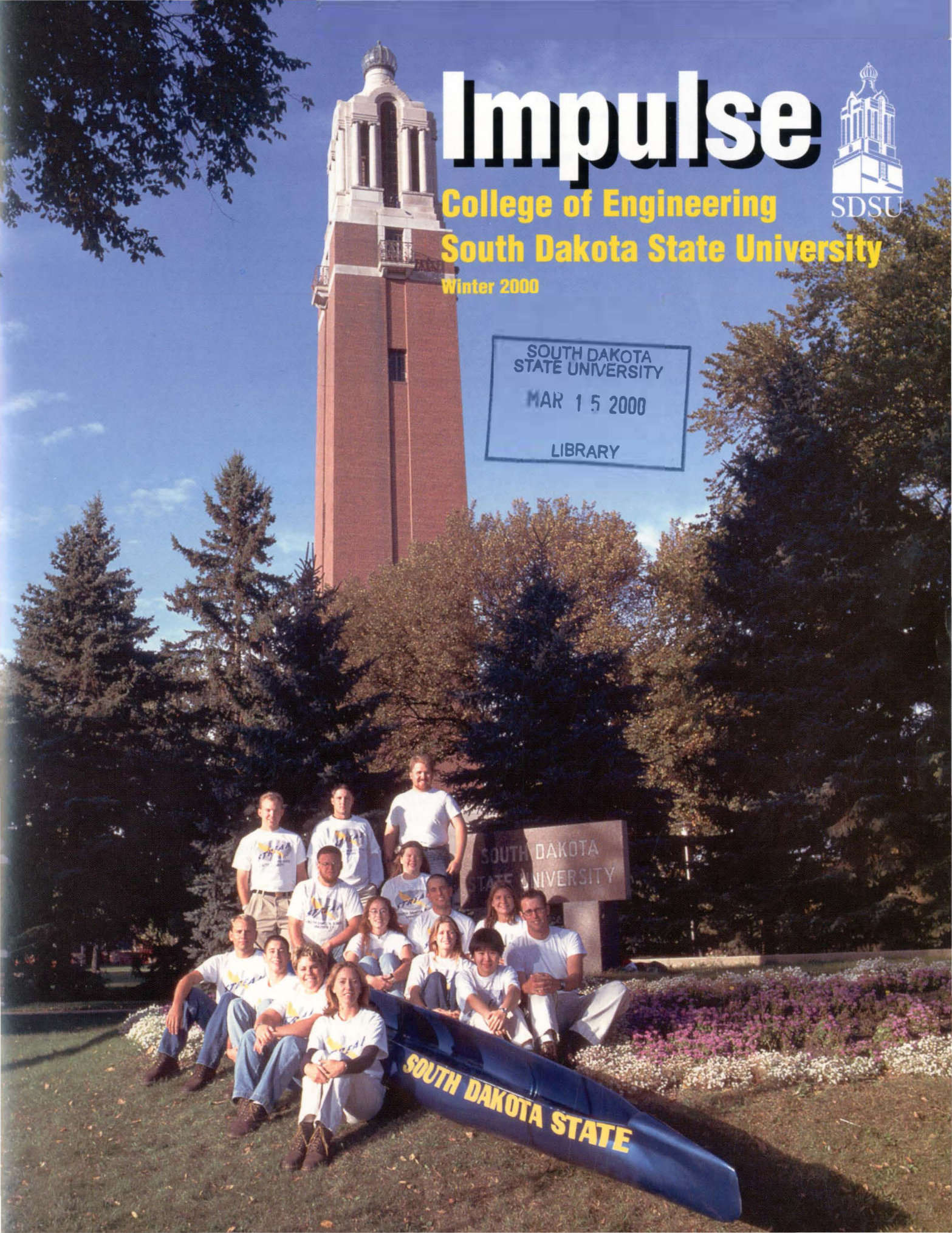
# Impulse

SDSU

## College of Engineering
## South Dakota State University

Winter 2000





# Dear
## *alumni and friends*

Change is a way of life! I am sure your lives are a dynamic experience. As with you, things are continually in a changing process at the South Dakota State University College of Engineering. The faculty, staff and students in the College look forward to the challenges of change. One can always argue that change, any change, is not good; however, that is not a realistic way of looking at life.

As this is written the challenge of hiring a new dean for the College of Engineering is in process. We have gone through the search process once without success so we will be reinitiating the search this summer. (See story Page 30.) In the meantime, I continue to enjoy this temporary position. No, I was not a candidate for the position as I thoroughly enjoy the position of Assistant Dean, mainly because of the close interaction with the students. The Dean's position is a step removed from them.

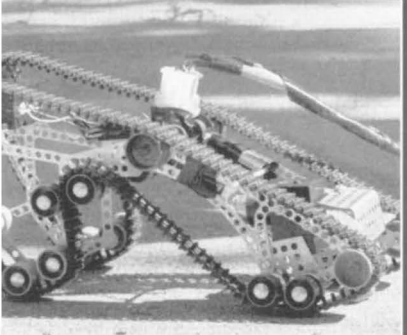
Retired Dean Duane Sander has kept you abreast of the progress for the renovation of Crothers Hall and also the much-needed new space with the addition. It is now determined that the addition will be added to Crothers Hall on the southeast corner. Many of you might recall the houses on that block and maybe some of you even lived there. The University purchased the property for the orderly development of the physical facilities for engineering. As reported by Duane, the beginning time for construction is scheduled for 2000.

Dr. Sander has kindly consented to be involved with the Foundation as a Special Projects staff member. This is great as it gives continuity to what he started as Dean of Engineering. Dr. Aelrud Kurtenbach rejoins the College as co-dean. I am pleased with his acceptance of the challenge. These appointments smoothly fill the gap until a new dean is in place.

My thanks go to each of you for supporting both the College of Engineering and the University. You are a critical part in the process of change that makes us proud to be a part of South Dakota State University.

Cordially,

*Virgil G. Ellerbruch, Ph.D., P.E.*
Dean of Engineering



Gopher: Could be used to inspect piping
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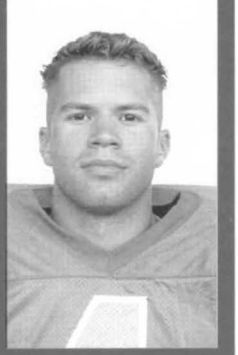

Brock Beran is an example of both academic and athletic discipline. It's not surprising that he is a success in both arenas.
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Generating excitement about working in the sky
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# Impulse

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Members of the prize-winning concrete canoe pose on the Campus Green.

Cover photo by Eric Landwehr.

## ■ Impulse


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# 'The best time I ever had'

## Concrete canoe team says their hard work was worth it

Excellence does not come cheaply. Just ask any member of SDSU's concrete canoe team.

It took thirty-six civil engineering students more than 1,500 hours of work to bring home their second consecutive regional championship last April at Platteville, Wisconsin.

One of the team's leaders, graduate student Travis Konda, of New Effington, knows from first-hand experience how much work went into the canoe. "What gets this canoe built is literally blood, sweat and tears," he says. "We do it on our own time, and we compete against large schools with large budgets and large donations of supplies and money."

Because the concrete canoe competition does not divide schools into classes, SDSU competes against universities such as the University of Iowa and the University of Minnesota.

Faculty adviser Chuck Tiltrum believes that hard work and dedication make up for what they lack in money and school size.

Tiltrum credits the South Dakota work ethic, and Konda agrees. "We've been out paddling on the Sioux River when there was ice in the water," Konda says. "The students here really work their tails off."

Is all that hard work worth it? Konda is sure that it is. "It was the best time I ever did," he says. "The learning experience has been invaluable."

Part of the learning comes through travel. Winning the regional competition earned the team the right to compete in the national competition last June, in Melbourne, Florida, where they placed thirteenth out of twenty-four teams. "On our trip to Florida," Konda says, "We got to see the kind of things that civil engineers do: bridges, roads, twenty-story buildings, dams, big, huge multi-million-dollar projects. It made me excited about becoming a civil engineer. Travel helps to expand your horizons."

For Travis's brother Darin Konda, learning the value of working with other people is something he gained from his work on the canoe project. "It really takes teamwork," he says. "You learn to count on other people." Travis added, "If you're in a leadership role, you must also learn how to motivate people, keep them interested."

One of the canoe's paddlers, Teresa Kub of Ipswich, enjoys encouraging others to join the team. "It's very rewarding to get other people involved and let them share the experiences."

The other paddlers were the Konda brothers, Brian Fitzpatrick of Foley, Minnesota; Laura Baumberger of Colton; Jennifer Briggs of Maple Lake, Minnesota; and Simone Tschida of Inver Grove Heights, Minnesota.

Since engineers frequently work together, the teamwork skills the students developed through the canoe competition will one day contribute to their success as engineers.

The canoe team also learned to apply their classroom knowledge to real world skills, something that will contribute to their future career success. "We used pre-stressing to hold the canoe together," Travis Konda says. "We took the basic concept of pre-stressing from the classroom and applied it."

In addition to the canoe's quality and the results of the canoe races, the team also is judged on its oral presentation, a written report, and a poster board display.

There was something else the students gained from all their hard work: fun. "It was a lot of fun," Darin Konda says, "especially at the nationals. One thing I remember from that trip happened just before the women's sprint. They had to delay the start of the race to let a dolphin pass through. That was neat. I won't forget that."

# Students get early start on research

When you're confident in your students, it's easy to trust them with important responsibilities.

That's the case at SDSU's College of Engineering, which routinely uses many undergraduates to conduct significant research, a practice unheard of at most universities.

Associate Professor David Galipeau frequently uses undergraduates in his research in electrical engineering. "There's more opportunity for undergraduates to conduct research here than at a larger school," he says. The fact that the College does not have a doctoral program, Galipeau says, is another reason there is more opportunity for undergraduates at State.

Lew Brown, associate professor and head of electrical engineering, says, "Undergraduate students at SDSU get research experience that many institutions only allow their doctoral candidates. This gives them a tremendous edge, especially in research fields or in product research and development."

Undergraduate students and some master's students handle the bulk of hands-on research activities for Brown's electostrictive ceramics and ferroelectric polymer research, which he conducts with chemistry faculty members John Fitzgerald and Jay Shore.

Brown depends on students to handle much of the research, such as conducting experiments and collecting data. "We would have nothing without their help," Brown says. "Plus, they get good technical and scientific experience."

One undergraduate student who has conducted research under Brown is Adam Sorenson, a second-semester junior from Lake Preston who has a double major of electrical engineering and computer science. He is currently taking twenty credit hours.

The electrical engineering career of Sorenson's dad had a major influence on him. "Ever since I was a little kid," he says, "I've been fascinated by electricity."

The "newness" of research is one of the things Sorenson enjoys about it. "I always like to find something I haven't done before," he says.

Sorenson's dream is to one day start his own company and invent electronic devices. But before that happens, he may go on to graduate school after he earns his bachelor's degree.

The future success of Sorenson and many other College of Engineering students will be due in part to the research experience they gained at SDSU.

Virgil Ellerbruch, acting dean of the College, says, "In recent years, there has been an increasing demand from employers that engineering graduates have a practice-based education. The use of undergraduate students in research laboratories gives them an excellent practice component to their education."

The students' research experience, Ellerbruch believes, "challenges them to develop critical thinking skills, communication skills, problem-solving skills, use of technology, and the integration of everything they have learned in the classroom."

Ellerbruch believes that the opportunity to conduct research leads to more confident students, "and their confidence will automatically extend on into their job after graduation."

**Adam Sorenson, a junior, has made the research laboratory almost a second home.**


# *Civil engineering student chapter* makes an impact

*How can civil engineering students from a small university in South Dakota compete against students from top universities such as MIT, Georgia Tech, Texas A&M, and Stanford?*

*How can they possibly compete against them and win? Yet, at SDSU they do.*

*In October, at the Civil Engineering Conference and Exposition in Charlotte, North Carolina, the SDSU chapter of the American Society of Civil Engineers accepted the Ridgway Student Chapter Award as the single most outstanding student chapter of ASCE in the nation.*

*Says Chuck Tiltrum, the chapter's faculty adviser, "Our students don't have to take a back seat to anybody."*

*During a panel discussion at the same event, Tiltrum and a few of the members of the SDSU chapter explained what it takes for an ASCE chapter to be successful. Their presentation listed six characteristics of a successful chapter, six reasons why they are successful.*

## First,

it takes outstanding student leaders. The current president of the SDSU chapter, senior Trent Bruce of Custer, said that each generation of leaders sets the tone for those who follow. "You want to live up to the expectations from previous years," he says.

Each year chapter leaders know that expectations are high, and they work hard to meet, or exceed those expectations. Working hard might mean not taking a paying job that could put much-needed spending money in their pockets. "To me, being president is my job," Bruce says.

The officers and their adviser are so dedicated to ASCE that each Monday night during the school year they take an hour and a half out of their busy schedules to meet in Tiltrum's office to prepare for future events.

Students and faculty at the 1999 American Society of Civil Engineers National Conference in Charlotte, North Carolina, receive the Ridgway Award.

**Secondly,**
the SDSU chapter is successful because they strive to get freshmen and sophomores involved. Freshmen are encouraged by upperclassmen and by faculty to become active members. Gaining experience early enables them to soon move into leadership roles, and to provide a continuity within the organization from year to year.

**Thirdly,**
a successful chapter requires a staff that is interested and involved. Tiltrum gives credit to administrators and faculty within the Civil and Environmental Engineering Department and throughout the College of Engineering for their strong support for ASCE.

The students have a choice of projects, including putting together Red Cross school supply kits for disadvantaged children, visiting elementary schools to help kids better understand what a civil engineer does, and working with Habitat for Humanity to help construct homes for low-income families.

**A fourth key**
to achieving a successful chapter is developing a worthwhile program. Professional speakers provide useful information at the bi-weekly chapter meetings. A schedule of coming events is readily available to members so they can plan ahead. Members are offered such a variety of activities that everybody can find a way to become involved.

Chapter activities are well documented through pictures, brief reports, and an in-depth, well-organized annual report that would be the envy of many corporations. Each year the new officers attend the Zone III workshop for student chapter leaders.

**Fifth,**
successful chapters participate in regional and national ASCE activities. The SDSU chapter is consistently well represented at the national convention, and at the section and branch meetings.

**The sixth**
requirement for a successful chapter of ASCE is an active adviser. It would be hard to imagine an adviser that was any more active than Tiltrum.

For Tiltrum, the best reward for his efforts is the national respect his students have earned.

"There's nothing better," he says, "than walking into the National ASCE Convention, and having the organization's national president walk across the hotel lobby and ask how things are in South Dakota. The pride in showing to the country that we've got top-notch people here at SDSU makes all the work worth it."

# *Tiltrum*
# The man behind the medals
## draws praises of students, Chapter Adviser Award

When you talk to Chuck Tiltrum, it doesn't take long to realize why he was recently presented with the American Society of Civil Engineers' Outstanding Student Chapter Adviser Award for Zone III.

The man truly loves working with the SDSU chapter of ASCE. "I never realized how much fun it would be," Tiltrum said. "It's the best part of my job. I just enjoy working with the students, because of their pride, their work ethic, and their enthusiasm."

Chapter President Trent Bruce knows Tiltrum has all of those qualities himself, and that his guidance has helped the chapter achieve national recognition.

"He has really been a big plus for our organization," Bruce said. "We wouldn't be where we're at without Chuck Tiltrum." Tiltrum estimates he spends at least eight to ten hours per week on his adviser responsibilities.

Those responsibilities weren't what Tiltrum had in mind when he graduated from Alcester High School in 1963. He attended SDSU for only two years before leaving to work in Beresford as a surveyor/inspector for the Department of Transportation. He soon left to join the Air Force, serving his country from May 1966 until March 1970.

Thanks to the GI Bill, Tiltrum returned to SDSU and received his bachelor's degree in 1972 and his master's in 1974, before accepting a position with the city of Sioux Falls, where he designed most of the improvements that were made in the city's sanitary and storm sewer systems.

While in that position, Tiltrum became registered as a professional engineer and land surveyor.

By 1981 Tiltrum was ready for a job change and there was an opening on the Civil Engineering faculty at SDSU. He talked to Dr. Dwayne Rollag, the department head, before applying. He became what he had never anticipated becoming: a teacher and a faculty adviser.

In their paper nominating him for Outstanding Adviser, students said of Tiltrum, "He truly is outstanding in our eyes." Tiltrum throws the praise right back at the chapter members. "We've got a great bunch of students. The Coach of the Year wins the award because he has great players, right?"

*Through lessons learned in high school, in the National Guard, and at college, LaRocque learns that*

# Hard work pays

College can turn into a busy four years, or even longer. Whether they're studying for a test, working on a project, or preparing for graduation, students have to manage their time wisely and focus on the task at hand.

Virgil LaRocque, a Chippewa Indian pursuing a master's degree in industrial business management, says time management and dedication are what got him this far, and that will take him even further.

A member of the Turtle Mountain Indian Reservation in North Dakota, LaRocque grew up in Riverton, Wyoming, on the Arapaho Shoshone Indian Reservation. During his last two years of high school, LaRocque devoted his weekends to the Army National Guard. Maintaining a good grade point average and participating in the Guard was tough, he says, yet he had no choice but to balance the two.

"I knew that if I wanted to get into a good school, I really needed to keep my grades up," he says. "But I also enjoyed the Guards, so I had to learn to manage my time so I could do both."

After high school, LaRocque spent four years in the United States Army, where he worked as an electrical and hydraulic mechanic. When he enrolled at SDSU, it was only natural for him to major in electronic engineering technology.

"I really enjoyed my work in the Army, and decided I wanted to continue with that field once I came to college," he says. "I just couldn't see myself doing anything else."

While he studied at SDSU, LaRocque worked part-time at Daktronics and was a member of the Native American Club, Society of Engineering Technologists Club, and the American Indian Science and Engineering Society. In recognition of his high grade point average, LaRocque received two Native American Daktronics Scholarships and the Brede and Siri Sander Family Scholarship in Engineering. He is also a member of the Golden Key National Honor Society.

In 1997, LaRocque received his bachelor's degree and decided to pursue his master's. Now, just a year away from graduation, he also works part-time in the Engineering Management and Technology Department, in addition to his work at Daktronics as a student design engineer.

At Daktronics, LaRocque assists in designing and thoroughly testing ProStar big-screen television display systems used for advertising and in professional sports stadiums. Gaining valuable knowledge about his field while attending SDSU has helped LaRocque stay focused, which is something he hopes employers appreciate after graduation.

"I have worked really hard to keep my studies up and learn about industrial business management, and I hope to further my career after I graduate," he says. "Students who work hard during college shall be rewarded for their efforts."

After he walks down the aisle during graduation in December, LaRocque hopes to remain in the Midwest working with electronics. But just because he has his degree doesn't mean he has to quit learning, he says.

"I will always be learning, no matter where I go," LaRocque says. "The field of industrial management is always changing, and that's what makes it so exciting—you never know what you'll see next."

## Scholarships reward

# Native American students

Cost has always been an important factor to consider when applying to colleges. During high school, students must put money aside for tuition, books, lab fees, and monthly living expenses.

The University and the College of Engineering hopes to make the financial end of college less of a burden for Native American students with three scholarships: the Daktronics, Inc. Native American Scholarship Fund; the Brede and Siri Sander Family Scholarship for Indians in Engineering; and the Ben Reifel Memorial Scholarship.

**Jason Boomer,** a junior civil engineering major and native of Martin, is a member of the Oglala Sioux Indian Tribe. Boomer has received a $500 Daktronics scholarship for two years in a row. With financial assistance, Boomer does not have to work while attending college and can participate in various engineering activities on campus, such as the American Society of Civil Engineers (ASCE).

"By participating in ASCE, I've enhanced my leadership and communication skills," Boomer says. "But most importantly, I've made a lot of life-long friends. If I had to get a job to pay for tuition and books, I wouldn't have this opportunity to interact with friends and classmates, and I wouldn't enjoy college as much."

**Barry Koepsell**, a member of the Oglala Sioux Indian Tribe and a Pierre native, has lived on the Rosebud and Lower Brule Indian Reservations in South Dakota. He knows more Native Americans would like to attend college, and believes they would if they knew they could receive scholarships to help them pay for their education.

"I know a lot of intelligent people on the reservations who would really enjoy college, if they only had the funding," Koepsell says. "They can't always rely on money from their tribe, but there is so much other funding available for them at SDSU. I think the University should really promote that aspect when they recruit students from Native American high schools."

His many activities and dedication to his school work earned Koepsell two $800 scholarships this year, one from the Brede and Siri Sander Family Scholarship for Indians in Engineering and the other from the Ben Reifel Memorial Scholarship.

Currently, he is president of the mechanical engineering honor society Pi Tau Sigma; vice president of the American Society of Heating, Refrigeration, and Air Conditioning Engineering; a Joint Engineering Council representative for the American Society of Mechanical Engineers; and a member of the Native American Club. He also organized this year's fall banquet in the Mechanical Engineering Department.

Financial aid would encourage Native Americans to attend college, Koepsell says, and SDSU faculty could take it from there.

"A lot of Native American students are intimidated about being the minority on campus, but they shouldn't be—there are a lot of people to help them out, to support them throughout their college career," Koepsell says. "Once they got here, I'm sure they would realize how supportive the campus faculty are."

**To qualify for scholarships:**

# Native American scholarships:

Engineering students who wish to qualify for the **Daktronics, Inc. Native American Scholarship Fund** must be tribally-enrolled, in good standing with SDSU and the College, and maintain a grade point average of 2.5 or above. One qualifying junior and one sophomore will each receive a $500 scholarship. The scholarship was established in 1994 by Daktronics, a major manufacturer of electronic scoreboards in Brookings.

Emma Sander Pendleton provided funding for the **Brede and Siri Sander Family Scholarship for Indians in Engineering** in 1992 because she felt strongly about the "economic injustices" done to Indian people since the early days of U.S. history.

Created in memory of the homesteading Sander family, the Siri Sander Family Scholarship is a source of funding for Native American students pursuing a degree in engineering. Academic ability, character, and promise to the field of engineering are the major scholarship criteria. Students in need of financial aid are given priority consideration, as are the orphaned.

One of seven children of Brede and Siri Sander, Emma was born on the family farmstead north of Howard. After graduating from Augustana Academy in Canton, she served eight years as the first woman auditor in Miner County. During World War II, she worked as an auditor for the War Department in such cities as Washington, D.C., Detroit, and Chicago. She later became a budget deputy for the Internal Revenue Service in Chicago, retiring after more than twenty-five years of service. Emma was married to Wrightley Pendleton, who died in 1980. She died February 25, 1991.

The **Ben Reifel Memorial Scholarship** was established by his daughter, Loyce Anderson, and her husband, Emery, both SDSU graduates.

Reifel, a native of Parmalee, died in January 1990. He graduated from SDSU in 1932 and received his master's degree in 1950 and his doctorate in 1952, both from Harvard.

Reifel was a boys adviser at Hare School in Mission and a Bureau of Indian Affairs fieldman at Oglala on the Pine Ridge Indian Reservation. He served with the Army for four years during World War II, was superintendent of reservation agencies, and was area director of the Bureau of Indian Affairs. He was elected to the U.S. House in 1961 and served for ten years. Reifel was then appointed to the National Capital Planning Commission. President Ford also named him interim commissioner of Indian Affairs for a brief time in 1978. He served as president of the American Indian National Bank.

Reifel was selected by SDSU as a Distinguished Alumnus in 1965, received an honorary doctorate of humanities in 1970, and was named one of six SDSU graduates as a 1988 Centennial Alumnus.

Recipients of the Reifel Scholarship are South Dakota high school graduates who are incoming SDSU juniors or seniors. They are enrolled members of a South Dakota Sioux Indian Tribe, and must maintain a minimum 3.0 grade point average during their preceding two semesters at SDSU.

## Industrial Energy Analysis Lab impresses customers, DOE

# Saving energy, saving $

When Khalil Gharbi first got a brochure offering free advice on how to cut production costs at S-T Industries, the mailing hit the circular file.

But when the brochure arrived next year, Gharbi's manufacturing firm was interested in undertaking energy conservation work, and he sent in the reply card to the Industrial Energy Analysis Lab at SDSU.

Gharbi, the vice president of manufacturing at S-T Industries, followed that with a phone call, and soon "things started happening." All at no cost to S-T, thanks to funding from the United States Department of Energy for the Industrial Energy Analysis Lab.

The lab employs three undergraduates, two grad students, and a coordinator. Their work also is overseen by two professors.

SDSU is one of thirty universities in the nation to participate in the program and the only center to serve the Dakotas and Minnesota.

It was a 130-mile trip for a group of three to visit S-T Industries in St. James, Minnesota, but costs for travel are also funded through Department of Energy funds.

The group prepared seven recommendations for S-T Industries based on the May 5 visit of the 130-employee plant. Gharbi said four of the recommendations have been implemented, and the remainder will be implemented in the firm's current fiscal year, which began November 1.

He said the recommendation that particularly caught his attention was the power factor correction.

"We were spending $120,000 for new electrical service. I was working with the power company and the contractor. They never mentioned it to me. I was impressed the group from South Dakota did. It really saved us some money," Gharbi said.

A power factor correction involves adding capacitance to the facility's electrical service to counteract inductive loads. This reduces reactive power, raising the facility's power factor and lowering its electrical demand charges.

Total payback for all of the recommendations was 2.1 years, Gharbi says.

John Prescher, a graduate student from Blue Earth, Minnesota, who has worked with the lab since November 1997, says the analysis looks at three areas: energy, waste products, and productivity. The analysts know what a company's utility costs are before they arrive at the plant.

Assessments have been made at industries as diverse as dog food manufacturers and iron foundries.

Common recommendations include switching to energy efficient lighting and insulating piping to reduce the cost of boiler operations. But each

plant is so unique that recommendations are rarely repetitive—or easy. It takes two months to develop the recommendations.

"Our work is checked by a professor to make sure the calculations are accurate and the assumptions are OK," Prescher says.

With heat transfer curves and thermodynamic equations a part of the paperwork, students need to be advanced in their engineering major before they can be hired at the lab, he says. Prescher, a 1998 mechanical engineering grad, started as a senior.

Gharbi remembers when the SDSU group visited S-T Industries, which manufactures precision measuring instruments and optical comparitors.

"At first when I looked at them, they looked a little young. So you get a little apprehensive. But as soon as they started interviewing me and got working, my confidence was up. They were qualified people," Gharbi says.

The work is "trial by fire," Prescher says. After a group tour, analysts split off to take individual looks at the plant.

"When I started, going into a new building was kind of awe inspiring. I didn't know what to look for and everything seemed to be running well," Prescher says. Now inefficiencies are easier to spot, particularly when students have access to budget information, he says.

Seeing how the facility spends its money and where waste materials go are vital to making many recommendations, Prescher says.

The work at the Industrial Energy Analysis Lab has been a vital part of Prescher's experience at SDSU, which he planned to wrap up in December with a master's degree in engineering.

"It's been a really great experience, applying what I'd really consider boring in the classroom, and going out into the businesses and seeing how they can implement that information. Also, it's an opportunity to learn what jobs I might be interested in and what jobs I want to avoid.

"There is no internship requirement for engineering, so I kind of treated it as such, using information I learned in class and applying it more practically," Prescher says.

While pursuing his master's degree, Prescher attends one class and works twenty to thirty hours per week at the Industrial Energy Analysis Lab in Crothers Engineering Hall.

"It's really interesting what I do, and it's nice being in Crothers so, if we have a problem, we can ask a professor," he says.

Prescher hopes the lab work can serve as a stepping stone for energy analysis work with a major utility company.

Not only has the lab been a good opportunity for students, the students have helped create one of the top industrial assessment centers in the nation.

Centers are evaluated by Department of Energy field managers on how many recommendations are acted upon by the industry. This year the SDSU center was in the top three in the nation, a first-time honor for the school.

In addition to the recognition, the center was awarded money to do an additional day of assessment at three locations plus $25,000 to do a special project, a compressed air study at Daktronics and Dakota Mobile Hydraulics, both in Brookings.

Top photos: Derek Hengeveld checks what a northern Minnesota manufacturer is throwing away. Knowing the waste stream is a key to becoming efficient.

Bottom photos: Hengeveld uses the power of a laser to get a temperature reading on a manufacturing plant furnace.

## To take advantage of a *good thing*

What manufacturer wouldn't be interested in saving money, reducing waste and increasing productivity?

Industrial assessment centers offer a chance for engineering faculty and students to provide free assessments with no obligation to act on any of the recommendations.

To be eligible, small and medium-sized manufacturing plants must meet three of the four following criteria:

- Gross annual sales below $75 million.
- Fewer than 500 employees at the plant site.
- Annual utility bills more than $75,000 and less than $1.75 million.
- No in-house professional to perform the assessment.

For more information, contact Kurt Bassett at SDSU:

605-688-4817

Kurt_Bassett@sdstate.edu

# Sparking an interest in science

What's green, sends off electrical sparks, and grabs the attention of high school students?

No, not dollar bills in a light socket, or a classmate's dyed hair charged with static electricity.

The answer, as any of the students in Lori Olson's physics class can tell you, is an electric pickle. The pickle demonstration was one of about ten presented by the College's High School Visitors Team to students in Olson's Brookings High School physics class.

The presentation at BHS was one of about twenty-five that the High School Visitors Team expects to make this school year.

Rachel Quam, a junior from Huron, leads the group of fourteen. The SDSU team ranges from freshmen to fifth-year seniors. A group of five goes on each trip, which makes visits throughout eastern South Dakota, including out-of-the-way stops like Rutland and Wessington Springs.

Now, back to the pickle.

In the Visitors Team's most popular experiment, screws are tapped into each end of a large dill pickle. A cord goes from a wall outlet, via a voltage meter, to one screw while the other screw is grounded. The green pickle burns an orangish brown and leaves a pungent scent.

"We like to leave that one for the end so we can get out of there," Quam joked.

She explained that the sodium and water brine that the pickles soak in is what turns the former cucumbers into good conductors of electricity. Quam also asked students where they might have seen that orangish light before. The answer is right on the corner—sodium vapor street lights.

For Megan Kirschman, a BHS junior, the pickle demonstration was the highlight of the fifty-minute presentation. "It was pretty interesting. I didn't know a pickle could do that," she says.

Andy Conley, now an SDSU junior and a member of the Visitors Team, remembers seeing the pickle demonstration when he was a junior at BHS. At that point, the electrical engineering major was already considering a career in science.

Olson annually includes the Visitors Team in her classroom plans. "My students get information on engineering, have fun with the demonstrations, and they get a little bit of information on the college."

Other demonstrations include what makes airplanes and Frisbees float, how the Doppler effect determines the intensity of sound waves, and how electricity can cause metal rings to rise.

The experiment that impressed freshman Christopher McCulloch involved electrical voltage and two students holding hands. One student held a Tesla coil wand. The electricity flowed through the body of one student to the other student, who held a fluorescent light bulb. The voltage was strong enough to light the 15-watt bulb.

Quam also pointed out the improvements that engineering has made in society.

She displayed the scientific calculator that SDSU Associate Professor Larry Browning had purchased for $450 in 1976. This early version also had magnetic strips that needed to be inserted for it to perform higher-level functions. Today, the same functions can be performed on a $90 calculator, she says.

Quam also noted the improvement in video games in the short time from her high school days to that of the audience.

One thing that hasn't changed is the attitude school teachers have about the Visitors Team, which is now in its sixth year. Some teachers have had the team visit every year.

# Generating excitement about working in the Sky

## What should I do when I grow up?

It's a question we start pondering at a young age and take serious consideration of in our teen years. SDSU, as part of the Space Grant Consortium in South Dakota, is trying to convince students to explore career opportunities in aviation and aeronautics.

Space Day, an outreach education program supported in part by a grant from NASA, is an annual event providing hands-on interactive demonstrations to create excitement and interest in math, science, technology, and the environment. Space Day also creates an awareness of industrial and educational resources available in South Dakota.

The site rotates annually between Pierre, Rapid City, and Sioux Falls.

The sixth annual Space Day is April 28, 2000, in Sioux Falls. Students from kindergarten to twelfth grade are invited, but the emphasis is on middle school and high school students, according to Kevin Dalsted, director of the Engineering Resource Center at SDSU and associate director of the South Dakota Space Grant Consortium.

Up to 5,000 students are expected to view booths and demonstrations, and hear a keynote speaker.

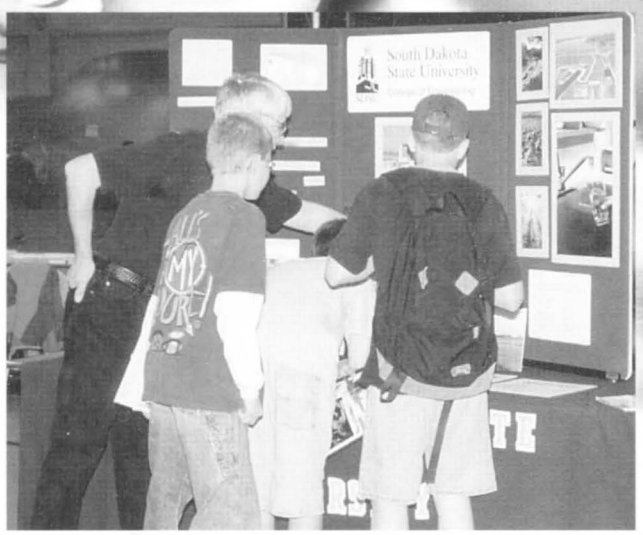
Past speakers have been from the National Aeronautic and Space Administration, which funds consortiums in each state.

In 1998, Charles "Chuck" Gemar, chief of Flight Test Operations and Safety at Bombardier Aerospace, the third largest manufacturer of civil aircraft in the world, was the keynote speaker. Last year, Roger Zwieg, a NASA senior research pilot and Watertown native, spoke.

Space Day 2000 will present Story Musgrave, America's most experienced astronaut. Check out his biography at www.nss.org/askastro/Musgrave/biography.html.

"We can sure sense a lot of excitement, especially with the astronaut speaking and with the hands-on booths," Dalsted says.

Space Day generally features thirty booths, including the Apollo EMU space suit, "Food in Space," and simulated moon rocks.




One of several exhibits from SDSU focuses on its summer Aerospace Career and Education (ACE) camp for teens interested in aviation. Other exhibits from SDSU include using remote sensing for weed detection in farm fields.

"The challenge is converting technical information to a level that would be of interest to high school students," Dalsted says. "Aerospace, aviation and technology—we're trying to get the kids excited about those areas.

"We give them handouts and pencils with our program name on them. You just hope they have some retention and think this is some neat stuff."

Curriculum kits are also available for science teachers who want to put wings to their instruction.

Space Day is a combined effort of South Dakota Space Grant Consortium members: South Dakota School of Mines, SDSU, Augustana, and EROS Data Center.

Industrial and educational affiliates also participate. These are Horizon's Inc., Rapid City; Raven Industries and Raytheon STX, both of Sioux Falls; Black Hills State University; Cheyenne River Community College, Lower Brule Community College, Oglala Lakota College, Sinte Gleska University, Sisseton Wahpeton Community College, Sitting Bull College, Science Linkages in the Community (SKILL), South Dakota Discovery Center and Aquarium, and the Teaching SMARTS program of Girls Inc., Rapid City.

For more information, about the South Dakota Space Consortium, see www.sdsmt.edu/space.

# Pocket Gopher buries the competition

Turning Jason Osbahr and Jim Steinmeyer loose in the toy store ignited an effort that sent the SDSU juniors to a national competition.

Osbahr, 26, and Steinmeyer, 38, qualified for the national American Society of Mechanical Engineers design contest Nov. 14, 1999, in Nashville, Tennessee, after beating twenty-two other teams to win the regional contest in April in Des Moines.

The ME majors built "The Pocket Gopher," an electronically controlled, track-driven vehicle with a four-wheel drive mentality.

The contest required vehicles to clear at least one of three pieces of 4x4 lumber in the twelve-foot course, pick up a rock, and return it to a designated circle.

Some of the entries at the regional contest tried to avoid all but the one required 4x4 hurdle. But The Pocket Gopher took the approach that the fastest way around an obstacle is through it.

"Our vehicle is so efficient going over the 4x4s that we could just go over them" while other teams lost time trying to go around the boards, Osbahr says.

The Pocket Gopher is able to act like an off-road vehicle because it's built nothing like a street machine. The rubber treads follow a "V" design that allows the front wheels to have contact with the ground even when the rear of the vehicle is still crawling up the 4x4.

But before design and construction work began, Osbahr, originally of Dakota Dunes, and Steinmeyer, originally of Spearfish, were in the toy stores.

"We hit anybody that carried toys," says Steinmeyer, reeling off a list of electronics, discount, and hobby stores.

# Gopher:

## Could be used to inspect piping

Osbahr says, "I grew up playing with remote control cars and building remote control cars." So excursions down the toy aisles added interest to the ME 240 class assignment, he says.

The plastic parts of The Pocket Gopher came from a toy tank. The aluminum frame was created at Daktronics, where Osbahr works as a mechanical designer. The frame, .05 of an inch thick, was lighter than other regional entries, Osbahr says.

The weight-to-time ratio is a key in determining the speed that the vehicle can operate, he says.

This fall the duo tinkered with design to reach the ideal weight. At the regional contest, the 537-gram (about two pounds) Gopher used two nine-volt batteries, which weighed fifty grams each.

In preparing for the national contest, Osbahr and Steinmeyer located a faster gearbox, replaced the nine-volt batteries with six AAA batteries at a savings of thirty-five grams, and switched the frame from .05 to .032-inch metal. As a result, The Pocket Gopher was a sleek 450 grams on November 14.

The changes also cut the time it took for The Pocket Gopher to run the course from fifty to thirty-five seconds, Steinmeyer says.

With those changes in place, Osbahr and Steinmeyer were ready to wow the eleven other competitors at the Opryland Convention Center. But it wasn't to be.

Test runs at the motel went great, and trial runs were scheduled from noon to 2 p.m. "But they weren't set up until three 'til two. There weren't any trial runs," Steinmeyer says. When The Pocket Gopher met its first 4x4, "it just sat there and spun," he says.

The Pocket Gopher was a victim of a slick surface (finely sanded, grade one plywood) and a repositioned center of gravity. "We only had the one chance," Steinmeyer says. Later the men repositioned the batteries to create a new center of gravity and The Pocket Gopher was running like a champ again.

"If we'd had a trial run at all, we'd have been OK," Steinmeyer lamented. "It was frustrating in that respect."

But even if The Pocket Gopher would have performed at its best, a national championship was unlikely. Steinmeyer says. The top two placers were made of balsa wood. Their light weights were factors in their winning scores, Steinmeyer says.

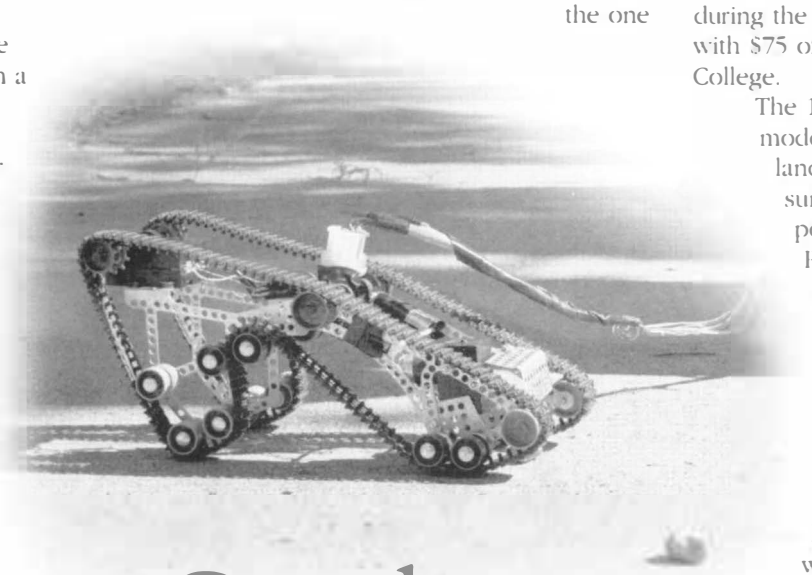
Apart from the frustration in Nashville, he says that buying batteries was the biggest challenge with the project. A plug-in transformer was used for testing, but the pair still spent more than $60 on thirty batteries. Expenses during the fall 1998 class totaled $120 with $75 of that reimbursed by the College.

The 1999 design contest was modeled after the Sojourner lunar land rover that explored the surface of Mars. From an earthly perspective, Osbahr says The Pocket Gopher could be equipped with a TV camera to do inspection in underground piping.

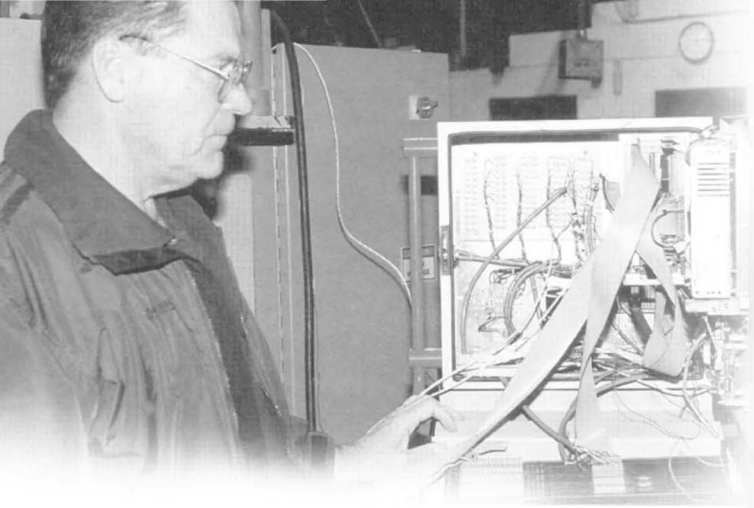
It was the first time either Osbahr or Steinmeyer had entered an engineering contest. From it they learned a couple lifetime lessons, besides which brand of battery to use (Energizer for higher output).

Recalling the use of the unique "V" design tracking, Steinmeyer found value in accepting new ideas. "Try something different. Don't be stuck with something that has always worked. That's the problem with others. They were kind of conventional."

Osbahr, remembering the adjustments made to a dominant entry at the regional level, observed that "the finished product is never complete. It can always be redone to be better."



The Pocket Gopher uses rubberized tracks on an aluminum frame to scale 4x4 lumber, and nine-volt batteries for power. Engineers Jason Osbahr and Jim Steinmeyer switched to AAA batteries before racing their mechanical engineering project in the national competition.



Gary Junker tackles a research and development project at Aberdeen Machine Tool. He is trying to incorporate an Acroloop ISA bus-mounted controller on an all-electric brake. Junker works at the business after earning his degree in electrical engineering in 1994 at age fifty-four.

John Aden works as a commander in the Sioux Falls Fire Department. He earned a degree in civil engineering at age forty.

## Non-trads agree that benefits outweigh challenges of late start

# You're never too *old*

During their days at SDSU, Jon Aden and Gary Junker were not your typical college kids.

Aden briefly attended South Dakota School of Mines and Technology in the early 1970s, then left school behind until becoming a part of the SDSU student body from 1987 to 1992. Junker's college days began in 1990, at the age of forty-nine.

Being a nontraditional student is challenging. "It was tough," Junker, of Aberdeen, says. "It wasn't easy catching up with kids who were years ahead of me as far as education is concerned."

For Aden, balancing the demands of college with the demands of his job as a Sioux Falls fireman and his family responsibilities was difficult. "I definitely had to manage my time, and I had to learn how to study," he says.

But because maturity usually comes with age, there are also advantages to being a few years older than your classmates.

"The first time I went to college, I was pretty much overwhelmed," Aden says. "When I went back, I did very well because I applied myself. I was there to learn, and that made a big difference. People going right from high school into college don't always grasp the importance of it because they haven't been out in the real world."

Maturity also makes a student less intimidated by instructors. "I'd challenge my instructors," Aden says. "If I didn't agree with what they were saying, I'd say wait a minute. Most traditional students are a little more reserved than that, so they don't want to challenge the establishment."

Traditional students are less likely to admit they don't understand something. But Aden didn't share their fear.

"I wasn't afraid to go to my instructor when I didn't understand what the heck was going on. I wasn't afraid to ask a question."

The same was true for Junker. "I didn't have the fear of my instructors that the kids did. Unlike them, I wasn't afraid to ask the dumb question. My classmates would bug me to ask the instructors things that they were afraid to ask."

Junker was working for an insurance company when he decided it wasn't too late for him to go to college.

"I'd never had the opportunity to go when I was younger," he says. "But I reached the point in my life where I could break loose and go, and I just took off and went. Engineering sounded like a challenge to me, so I went for it."

Thanks to his degree, Junker now works as an electrical engineer in research and development for Aberdeen Machine Tool, and he loves his new career.

For Junker, the effort was worth the reward. "It was a good feeling getting the education, learning things that I never dreamt I could learn," he says. "I found out that I was still able to learn. I'm more confident now."

Aden's degree led to a Sioux Falls Fire Department promotion to commander. During his shift, he's in charge of the north half of the city. "When we have a fire," he says, "I'm the one who's in charge of the fire, and making sure everybody gets to go home the next morning."

There is no doubt in Aden's mind about the correctness of his decision to return to college. "I'd do it again," he says. "I really would. It was a very good experience."

# One test = Eight hours

## The grueling Fundamentals of Engineering test wipes out students, but the results speak for themselves

Taking the eight-hour Fundamentals of Engineering test is not a relaxing way to spend a Saturday.

Josh Larson of Vermillion, who took the test on October 30, calls the experience, "pretty exhausting. After taking it, you can hardly think anymore."

But SDSU engineering students do a very good job of thinking during the exam. The College's civil, electrical, mechanical, and agricultural engineering students all score above the national average.

While the test, which is not required for graduation, covers all areas of engineering during the morning session, civil engineering majors are most likely to choose to take it. It's simply expected in their profession. Only seniors are allowed to take the test.

At SDSU, twenty to thirty-five of the sixty students taking the test each semester are from the Civil and Environmental Engineering Department. During the past six semesters, their test results have been 10.3 percent above the national average.

An average of ten to sixteen test-takers come from the electrical and mechanical engineering departments, respectively, while about three ag engineering students take the test each semester.

Civil engineering student Larson was nervous before he took the test. "I didn't have the time to study a whole lot for it because I was busy with other stuff," which included preparing for tests in several classes, and working on his senior design project.

Trent Bruce, a civil engineering major from Custer, spent the week prior to this fall's test in Charlotte, North Carolina, at the National American Society of Civil Engineers' Convention. He has served as president of the SDSU chapter of the organization. "Because I'd missed a week of school, I had four or five tests to prepare for when I got back."

Bruce found the Fundamentals of Engineering test draining. "After eight hours of testing, you look up and you can't even see straight," he says.

Troy Borchard of Brookings had to fit test preparation time into a schedule that includes full-time school and a full-time job with the state Department of Transportation. He and his wife also are raising two teenagers.

When Borchard took the test October 30, he would have preferred to have more time to study.

"I probably didn't start studying soon enough, but I did take time off from work to study really hard the two days before the test. Basically, during those days I did nothing but go to my classes, go home and read a review manual to try to bring as much information as I could to the front of my memory," he says.

The students will need to wait until late January or February to learn their test scores, but they don't see any point in worrying about it. "Once the test is over," Borchard says, "you figure either I passed it, or I didn't."

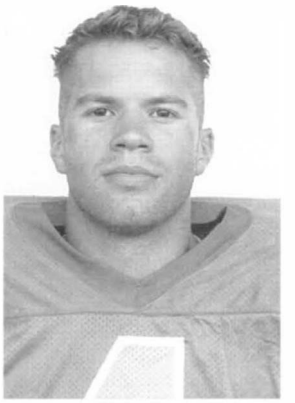
Two members of the South Dakota Engineering Society administer each test session. "We do it as a fund-raiser," Seth Hansen says. The fee they're paid goes to engineering scholarships.

After picking up the tests at the office of the dean of engineering, Hansen says they go to the Animal Science Building and post the seating chart, before verifying the identification of the students as they arrive. Students are only allowed to bring a calculator with them, and they are given an equations booklet for the day.

Hansen, a department manager at Daktronics, took the test himself in 1985, his senior year as an electrical engineering major at SDSU. He prepared for the test by attending all the review sessions, buying a test guide booklet, and "studying, studying, studying."

Hansen passed the test. "Because you have to wait so long for the results, it's quite a relief when you finally find out you passed," Hansen says. "When you get that letter in the mail, it feels good."

# Making big gains



## Self-discipline key to classroom, gridiron success

Brock Beran is fast. No question about it, just ask the North Central Conference defensive backs that have tried to cover the SDSU wide receiver.

But the civil engineering major will tell you that being quick with his feet is only part of his challenge. He also needs to be quick with his mind.

"You have to be able to focus on the professor in the classroom. Then you have to drop everything when it's time for football and concentrate on that. Then when it's time for homework, you have to be able to turn off football and turn on studies. That's hard, you've got to be able to turn it on and off, just like a light switch," Beran says.

Beran, a junior from Omaha, Nebraska, has proved himself to be a pretty good light switch.

He has maintained a 3.4 grade-point average while starting for three years on the SDSU football team. But success hasn't been easy.

"You can't get behind. You have to go to class and keep on top of your work because if you get behind, it's really going to hurt you. It helps having older guys on the team in engineering. You can ask what teacher to take or how to prepare for exams," Beran says.

Beran, a 5-10, 160-pounder, finds his help from a couple offensive lineman—Craig Ploetz and Brad Beck.

Ploetz finished his athletic career in the 1998 season, but has continued to assist the team. Beck is a 6-2, 280-pound junior from Estherville, Iowa. "He's in a bunch of my classes. He's just a really smart guy. We do all our homework together," Beran says.

Just how smart? Well, this fall Beck was named to the North Central Conference All-Academic football team with a 3.725 grade-point average. Beran was an honorable mention pick.

Homework at Beck's house is a nightly routine. But, just because it's routine doesn't mean it is easy. Combining football and a tough academic major has its challenges.

"The hardest part is when practice is over and you've had dinner. It's eight o'clock and you have to find the energy and motivation to get your homework done. You see other people just laying around watching TV, doing their own thing, but you've got to find the discipline to get it done," Beran says.

He takes about thirteen credit hours during the season and fifteen hours during the off-season.

During fall semester 1999, Beran's toughest days were Wednesdays.

His schedule: Class begins at 9 a.m. and goes straight through until 2 p.m. with only a half-hour break. Weightlifting goes from 2 to 3 p.m., and team meetings last from 3 to 4 p.m. Practice is from 4 to 6 p.m. After an hour for dinner, homework begins at 7:30 or 8 p.m. and lasts until "10, 11, or 12. However long it takes."

Then it's time for film, and it's not a Denzel Washington flick.

Beran and his roommate spend forty-five minutes to an hour watching game film of the next opponent. Like the effort put forth with the textbooks, the time spent watching game films has paid dividends. Beran finished the season with forty catches for 655 yards and four touchdowns.

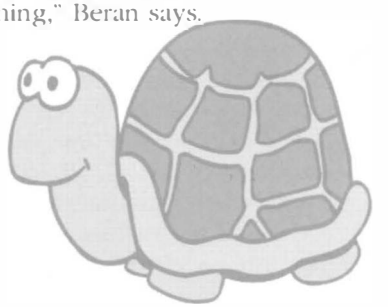
The Jacks finished 8-3 for their best mark since 1979. Their goal for 2000 is the conference championship.

Beran's academic goal is to graduate in May 2001 and then pursue a career in engineering design, perhaps as a city engineer. Beran had an interest in engineering when he prepped at Millard South and enrolled at SDSU in general engineering.

He switched to civil engineering in his sophomore year because of a desire to work outside at the job site. "I love nature, just being outside."

Beran also has a love for reptiles.

"Besides football and school, it helps to have your own little hobby. Mine is collecting turtles and lizards . . . I have about 100 turtles. During fall camp I hatched out about eighty turtles. Sunday I spent three or four hours cleaning filters and feeding them. It helps me just to get away from football, to get away from engineering. It's my release from everything," Beran says.



# Athletes majoring in engineering — listed by sport and department

**Baseball**
Jeff Biehn, mechanical
Jeremy Deutsch, civil
Tom Mousel, civil
Sean O'Leary, electrical
Paul Sanow, civil

**Men's basketball**
Jared Gass, general

**Women's basketball**
Sarah Rippke, civil

**Cross Country**
Kevin Doe, electrical
Doug Peterson, civil
Andrew Sorenson, civil

**Football**
Kevin Almer, civil
Brad Beck, civil
Brock Beran, civil
Darius Boomsma, pre-computer science
Andrew Brandt, electronics engineering
Kevin Brown, general
Dan Fjeldheim, pre-engineering
Cody Franzen, mechanical
Matt Fritze, pre-engineering
Dale Heiden, mechanical
Robert Johnston, electrical
Adam Klick, pre-engineering
Matt Kopp, pre-engineering
Jason Langland, general
Jesse Liggins, general
Phillip Oksness, pre-engineering
Craig Pelan, pre-computer science
Chris Quail, mechanical
Brian Reed, construction management
Matt Rock, electronics engineering
Chad Ronshaugen, pre-computer science
Nate Scheuer, pre-computer science
Ben Studer, ag engineering
Adam Threadgold, pre-engineering
Richard Turner, pre-engineering
Andrew Wagstrom, pre-engineering
Ben Waits, construction management

**Golf**
Jeremy Goodroad, mechanical
Ross Petrick, manufacturing engineering
Tom Hamlin, civil

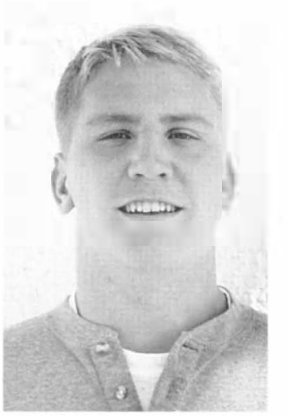
**Softball**
Leah Armstrong, pre-engineering
Marlena Fryslie, pre-engineering

**Swimming**
Mike Kraft, pre-engineering
David Niemiec, pre-engineering
Joel Perrozzi, electrical

**Volleyball**
Kelly Hoemann, pre-computer science

**Wrestling**
Scott Braun, manufacturing engineering
Marcus Hellwege, pre-engineering
Paul Konechne, electrical
Cory Mettler, electrical
Todd Paszek, pre-engineering
Matt Spitzner, pre-engineering

# Joint Engineering Council brings unity to College



One of the challenges for the Joint Engineering Council is to promote unity within a large college, and this group embraces a challenge.

Comprised of student representatives of every engineering society and group in the College, the council blends students from ten different disciplines.

"We sponsor activities for the entire College, including the Engineering Job Fair, Shadow-An-Engineer, and the Engineering Volleyball Tournament," says Jon Schultz, the JEC's 1999 president.

One of the major annual events that JEC oversees is the Engineering Expo, which takes place each spring in Frost Arena. Corey Halstead chairs this year's Expo, which will be April 28.

The Expo features high school and college contests, industry booths, and the ever-popular "Wonders of Science" show, in which Larry Browning, associate professor of physics, demonstrates scientific theories.

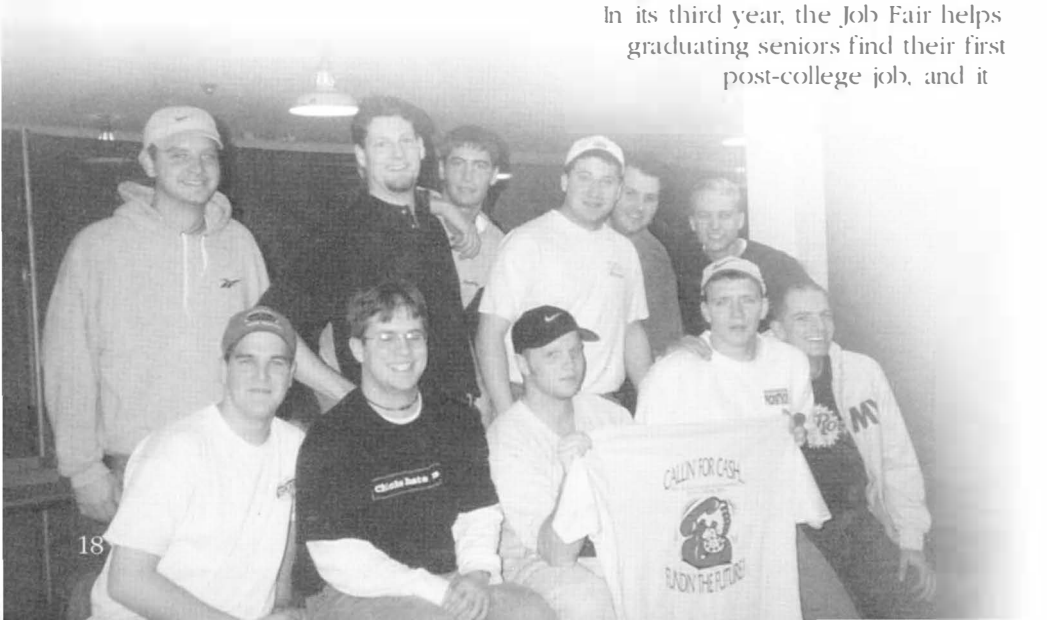
Each spring, engineering students exchange their calculators for a volleyball and compete in the Engineering Volleyball tournament in the Barn. Teams of engineering students from the various departments do battle on the court, enjoying friendly rivalries, while making new friends from within the College.

The Shadow-An-Engineer program gives engineering undergraduates the chance to experience engineering in the real world. The vice-president of JEC is responsible for coordinating the program in which students use their Christmas or spring break to observe an engineer on the job.

In its third year, the Job Fair helps graduating seniors find their first post-college job, and it helps underclassmen find internships and co-ops. It takes place in October, and has grown to include more than forty companies and more than three hundred students.

Being involved in JEC makes students more aware of upcoming College events. For Schultz, there have been other benefits as well.

"It teaches time-management, leadership, teamwork and professionalism, and it has been really interesting. I've met a lot of people, seen a lot of new places. Being involved in engineering societies is a great way to make valuable connections with fellow classmates and teachers. It has also given me the opportunity to travel to St. Louis, Omaha, Los Angeles, Fargo, and Canada. It has added variety to my life."



Members of the Joint Engineering Council are, back row, from left, Brian Top, Mike Solheim, Chris Bessler, Ron Jensen, John Nilles, and Justin Artz. Front row, Chris Stimson, Brian Schuldt, Scott Gillen, Trent Bruce, and Eric Pierce.

# **400** students + **60** phones = **$100,000+**

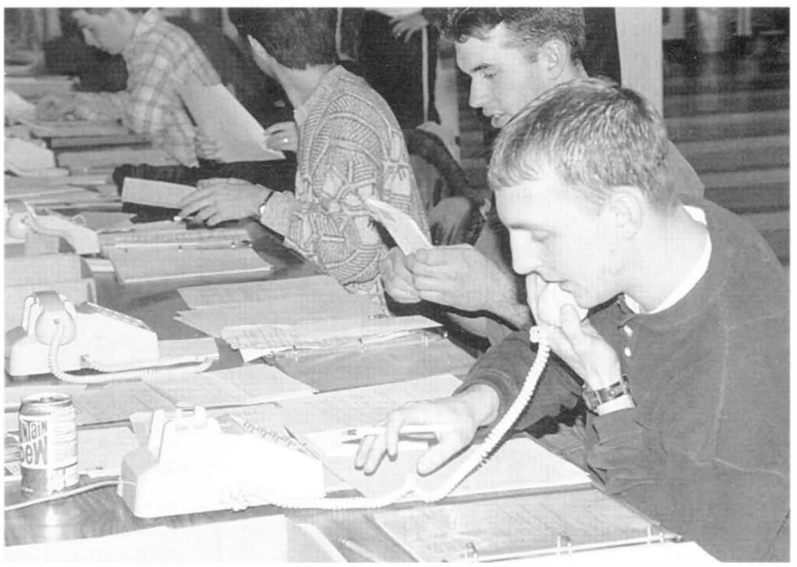
Engineering students from throughout the College are gearing-up for the College of Engineering's annual phonathon, which runs February 6-11.

Heavily promoted by engineering teachers, students are encouraged to help. More than 400 students volunteer their time to make close to 4,000 calls, and receive approximately 1,600 pledges.

Trent Bruce and Teresa Kub are the co-chairpersons, with Randy Schock serving as assistant chairperson. The Joint Engineering Council oversees the event, in which students solicit donations from engineering alumni. Last year the phonathon raised more than $100,000 for a variety of projects within the College.

Sixty phones are set up in the basement of Pierson Hall for the phonathon. Prior to its start, volunteers attend a training session to learn the proper way to make a fund-raising call and to go over the administrative details for which they will be responsible.

Preparation for the phonathon begins shortly after Hobo Day and intensifies after Christmas vacation.



Students keep busy making phone calls and handling paperwork at a past phonathon. This year's phonathon is February 6-11.

## Moonbuggy engineeers

Senior engineering students, from left, Rob Marshall, of Vermillion; Ryan Basanko, of Aberdeen; Aaron Althoff, of Watertown; and Kory Kludt, of Miller; describe and defend their project, "NASA Great Moonbuggy Race 2000," at the annual Senior Engineering Design Contest in the University Student Union Nov. 16. Twenty-four teams presented projects. The moonbuggy project was a preliminary version of a buggy that will race in April in a NASA contest in Huntsville, Alabama.

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# A birdseye look *at student groups*

Editor's note: *The following stories tell about some of the engineering opportunities offered to SDSU students outside of the classroom.*

## Associated General Contractors

The Associated General Contractors Student Chapter offers students a chance to expand upon their network of professional contacts, says John Reposa Jr., coordinator of the construction management program and adviser for the AGC Chapter.

Open to students of any major, the AGC Chapter at State prepares students to manage all aspects of a construction project, and will help them become well-versed in engineering, construction and management skills, Reposa says.

"The AGC Chapter at SDSU helps students become more directly involved with contractors, which will help them get a good job both during and after college," Reposa says. "Students in the chapter are not just exposed to instructors, but to contractors, as well."

South Dakota has two AGC Chapters: a Building Chapter and a Highway Heavy Utility Chapter. Students in the SDSU Chapter often attend regional meetings and visit with South Dakota Chapter members. Such opportunities allow students to make contacts with contractors who could help them find a job after graduation, Reposa says.

Last March, forty-two students in the chapter at State visited Las Vegas, Nevada, for the ConExpo/ConAGC Exhibit, the largest construction exhibit in the United States. With 1.8 million square feet of display space, ConExpo typically draws more than 100,000 people. In addition to touring parts of Las Vegas and tossing the dice, students met a number of contractors that could serve as contacts after graduation.

During the convention, the South Dakota AGC Building Chapter's Board of Directors treated SDSU's group to lunch. Students received free passes to more than 100 different seminars and met many professional contractors. They also examined the different methods of construction used on various buildings in Las Vegas and visited Hoover Dam, where they received a special "hard-hat tour" through the cooling and inspection tunnels. The tour guide revealed various methods that staff used to mark and monitor cracks in the dam, and also answered any questions concerning the construction of the dam.

Students also learn team management skills and make new friends by participating in the AGC Chapter at State, Reposa says.

"Both personally and professionally, this is a great organization for students to be involved in," he says.

This spring, Reposa hopes to send two students to St. Louis to observe regional competitions, where construction management students compete against one another as they choose a project, estimate the cost and length of the project's plan, and draft and carry out plans to complete the project. By the 2000-2001 academic year, the AGC Chapter at State should be ready to compete in regionals, Reposa says.

"After five successful years of the construction management program, I think our students are ready to get a team together for observation and planning," he says.

Students in the AGC Chapter at SDSU have the opportunity to receive scholarships from both of South Dakota's AGC Chapters, Reposa says.

Cody Lammers, a junior construction management major from Sioux Falls, is corresponding secretary in the AGC chapter at SDSU. Actively participating in the chapter has paid off in more ways than one, he says.

Cody Lammers

Stewart Olson

This year, Lammers received a $250 scholarship from South Dakota's AGC Chapter and a $1,500 AGC National Scholarship. He will receive the $1,500 scholarship every year until he graduates.

In addition, guest speakers and alumni who have spoken to students in the AGC Chapter at State have provided Lammers with valuable information about future job requirements and worthwhile activities.

"I know SDSU alumni who were in AGC will also help me once I get out into the workforce, too, so that's a bit of a comfort," Lammers says.

At S & S Construction in Sioux Falls, Lammers is gaining experience constructing small offices, apartment buildings, and houses. Lammers has always liked to build, he says, and being able to see his work is something he also values.

Lammers would like to see student membership in AGC increase.

"There are over 120 students in the construction management program at SDSU, and only about a third of them come to the meetings," Lammers says. "I don't know if the students realize what they're missing out on. We do so much that will help construction management majors after they leave college. It's just too bad more students don't want to experience that."

Stewart Olson, president of AGC for the 1999-2000 school year, agrees. Bringing in speakers with professional experience in construction management

is beneficial to chapter members and paves the road to success after graduation, he says.

"As a liaison between AGC members and construction management students, the AGC Student Chapter at SDSU really prepares students for what they will see after they graduate," Olson says. "When they leave SDSU, our chapter members should know exactly what contractors are looking for in new employees. The students make friends with contractors who will help them get their foot in the door after graduation. That is by far the greatest benefit of AGC."

## International Microelectronics and Packaging Society


Kraig Mitzner

Professional research in microelectronics finds listening ears in meetings of the International Microelectronics and Packaging Society.

Dave Galipeau, professor of electrical engineering, is adviser of IMAPS. Typically composed of ten or twelve students, the organization was formed at SDSU in 1983 with goals to foster and promote the knowledge of the microelectronics industry to students. To achieve these goals, IMAPS students meet weekly to discuss research activities, as well as participate in one or two workshops each semester, embark upon field trips to local microelectronics companies, and attend a national symposium each year.

Five IMAPS students attended the International Microelectronics and Packaging Society conference in October and took home $250 after placing second. The conference was divided into two parts: short, technical presentations on current technology and research, and trade shows where companies display the best and latest equipment in the field.

Kraig Mitzner, president of IMAPS in 1999, originally set a goal of "doing well" at the conference. Taking home second place made him extra proud to be a member of IMAPS. And, by working with research and taking tours of manufacturing plants throughout the region, Mitzner and other members of IMAPS were able to apply the knowledge they learned in class to practical situations.

"It's great to actually be able to put the theory to practice," he says. "In school, we go through the math and do the homework, but it doesn't always make much sense until we get into the real world and experience it ourselves. That's where IMAPS steps in, so we can see that what we're gaining at SDSU is valuable knowledge and experience."

Students in IMAPS also assist the Joint Engineering Council in recruiting students to the College of Engineering by traveling to area high schools and demonstrating various engineering projects.

Students interested in any of the numerous specialty fields of electrical engineering can join IMAPS to learn about the field while at school, instead of waiting until they get out in the business world, Galipeau says.

"On a day-to-day basis, IMAPS provides a forum for disseminating current microelectronics research at SDSU to students interested in the field," he says.

## American Indian Science and Engineering Society


Michelle Knuppe

There are many places on campus where Native American engineering students can turn for support and guidance, one of which is the American Indian Science and Engineering Society Student Chapter.

Open to students of any major, AISES is designed to promote science and engineering while assisting Native American students who want to pursue the field in finding employment opportunities. More than 156 college chapters exist throughout the United States and Canada, including six in South Dakota. AISES provides more than $600,000 in scholarships and will post students' resumes at national conferences, as well as assist students in finding internships.

Nationally, the group sponsors high school programs that promote hands-on activities to engage students in science and engineering learning, adviser Larry Browning says. In the past, AISES members at SDSU have visited the Flandreau Public School to tutor high school students in science and engineering.

Michelle Knuppe, a senior engineering physics student from Rapid City, received a $1,000 scholarship for actively participating in AISES while she attended SDSU. In addition, she attended two national conferences (Detroit, Michigan, in 1996 and Minneapolis, Minnesota, in 1999) and an international leadership conference (Colorado Springs, Colorado, in 1997) for AISES. Her experience with the organization has proved worthwhile, as she felt confident graduating in December with so many professional contacts and friends she formed through the organization.

"AISES is such a great organization for Native American students to get involved in—it's an opportunity they shouldn't pass up," Knuppe says. "All of the services and friendship I've experienced has really helped me throughout college, and I'm sure AISES will continue to help me after college, too."

Knuppe works part-time in the science and applications branch at EROS Data Center near Sioux Falls, collecting data for scientists.

While her husband, Jay, and three-year-old son, Trent, are supportive of her pursuing a career in engineering, not all Native American families are aware of the opportunities an engineering degree offers, she said. Knuppe would like to see the College of Engineering recruit more Native American students by regularly visiting reservation-based high schools and college advisers keeping a line of communication open between potential students and SDSU advisers.

"If Native American high school students knew the many things they could do with an engineering degree and the tremendous amount of support that awaits them at SDSU, I think they would be much more likely to enroll at State."

Continued from Page 21

## Computer Club


Leon Ellis

Some computer wisdom may only be a click away, but the Computer Club gives students a chance to click with professionals in the field while keeping informed about new software developments and making friends.

Representatives from area and national businesses, such as Daktronics and IBM, frequently visit campus to speak with the twenty club members about field requirements and developments, internships, and possible jobs after graduation.

Students in the Computer Club also compete in regional and national competitions. After competing in the regional Association for Computing Machinery Contest in Lincoln, Nebraska, a team of club members will travel to Orlando, Florida, this March to compete in the national ACM Contest.

Leon Ellis, a senior computer science major from Rapid City, is president of the Computer Club for the 1999-2000 school year. Under the advisement of Sung Yun Shin, associate professor of computer science, Ellis hopes to bring more business representatives to campus to speak with club members.

"Computer science is not just sitting down and writing code for eight hours a day," Ellis says. "We try to bring in many different computer-related job (representatives) to let our (club) members get a taste of what is out there."

Ellis also hopes to organize a spring trip to a major city where club members will visit various programming firms.

Being a member of the Computer Club has many benefits, Ellis says. He not only won a scholarship from the club, but has also made contacts that could help him find a job after graduation. In addition, he's learned what teamwork is all about.

"Being in a club is just like being on a team," he adds. "Everyone has their part to do, just like in computer programming—each person does a little bit and then we put it all together to make one big working program."

## American Society of Agricultural Engineers


Laura Stern

Professionals rub shoulders with students in activities of the American Society of Agricultural Engineers, says student chapter adviser Dan Humburg.

Made up of about forty active students, ASAE is designed to give students a sense of professionalism and to show students what services their professional society offers. The chapter encourages students to gradually become more involved in their profession so they can have a headstart on other students after they graduate, Humburg says.

Student members can attend professional regional and national meetings at affordable rates, which allows them to meet other students in the profession and make valuable after-college contacts, Humburg says. This year, about thirty students attended the regional meeting in Winnipeg, Canada, where SDSU students joined those from North Dakota State University, the University of Manitoba, and the University of Saskatchewan to observe professionals presenting their research materials and examine new products displayed by industry representatives.

At regional meetings, members of ASAE can also compete in a student design competition. Within a time limit of forty-five minutes, students must use a package of unusual materials to create a project objective, solve problems, and demonstrate a solution.

"I don't think the students always recognize how valuable these conferences are," Humburg says. "By absorbing all the latest information in the field of agricultural engineering and making contacts with various professionals, students will know what to expect when they graduate and head out into the workforce. And besides that, it's a lot of fun."

ASAE also sponsors various speakers, both professional agricultural engineers and SDSU alumni, and participates in a quarter-scale tractor contest sponsored by the National ASAE Chapter. In the tractor contest, students are given an engine and a set of tires and must build the rest of the tractor and present their completed project in the Quad Cities in Illinois in May. The competition is based on written and oral skills, as well as the quality of the tractor, as judged in a competitive pull event.

Each year, the group also sells raffle tickets for the "Watch Bertha Blow" contest, in which they drain the oil out of a car and people guess how soon it will take for the engine to stop running, or "blow up." The person with the closest guess receives a prize valued up to $200. Leftover funds are applied toward other ASAE activities.

By actively participating in ASAE, students gain a sense of professionalism and learn leadership skills by coordinating fund-raising events and serving as club officers, Humburg says.

"Learning how to motivate people and take responsibility, as well as ensure that other club members take responsibility for their share of the work, can only be gained through experience," he says.

Laura Mehlhaf Stern, a senior agricultural engineering and English major from Menno, was president of the university ASAE chapter in 1999. Some of her goals as president were to get more freshmen involved in ASAE, create a network for students to become more familiar with the agricultural engineering major, and to strengthen existing friendships within the group by participating in chapter bowling, softball, and volleyball events.

Stern not only learned valuable skills as a professional engineer by being a part of ASAE, but she also found a social outlet for forming new friendships and adjusting to college, she says.

"ASAE is a circle of support in many aspects," Stern says. "It's a place where freshmen can make friends easily and feel as if they belong. Students have the chance to receive so many opportunities through ASAE, such as learning communication and leadership skills and forming possible job contacts. It's just a great group to get involved with."

# Computer team gets all the answers

## Second-place finish allows squad to compete at world finals

A team of computer science students from SDSU outsmarted eighty-two other schools to place second at a regional competition, earning them the right to compete internationally this spring.

The team of Bryan Blom of Rapid City, Bruce Carlson of Brookings, and Ryan Neuharth of Sioux Falls placed second at the North Central Regional Programming Contest at the University of Nebraska-Lincoln November 13.

Each team faced six computer programming problems, which they had to work together to solve. SDSU solved all six. Only three other teams of the eighty-four that participated could claim the same. "Normally, no team gets them all right," says coach John Hastings, assistant professor of computer science.

Such a win "sure makes it look like we're teaching the right things," Hastings adds, "but most of the credit should go to the students. These are students who really want to learn, both in and out of the classroom.

"We went up against some bigger schools, like Iowa State, Kansas State. We beat the University of Nebraska, which is probably three or four times as big as we are. And UNL actually had a contest before this competition amongst eight or nine of their teams to see which two would go to regionals. Ours was purely on a volunteer basis."

For placing second at the regional, each SDSU team member won a $1,000 graduate stipend should they choose to attend graduate school at UNL; plus Microsoft software, plaques, ACM T-shirts, and UNL souvenirs. They also won a slot at the world finals in Orlando, Florida, in March.

SDSU also sent a second team, comprised of Leon Ellis of Rapid City, Adam Sorenson of Lake Preston, and Joe Wiemann of Webster.

"The guys on our first team are some of our best and most experienced students," Hastings says. "The guys on our second team are also very good, but this was their first time at a competition. The experience they gained will serve them well next year."

Hastings says UNL hosted a good competition that included a strong element of fun for the contestants.

"They had a good time. The University of Nebraska put on a good show."

A total of 1,963 teams from sixty-nine countries competed in twenty-nine regional Association for Computing Machinery-International Collegiate Programming Contests held throughout the world. All students who took part got free software from IBM.

# Physics students tabbed outstanding

If Sir Isaac Newton were around today, he might be considering another law of physics—each year an Outstanding Chapter award will be presented to the SDSU Chapter of the Society of Physics Students.

The award is virtually an annual occurrence for the twenty-member group, which is advised by Oren Quist and Larry Browning.

Selection by the national office is based on the year's activities and accomplishments. Among the club's activities are: holding a star party for local Girls Scouts, serving on the College of Engineering High School Visitors Team, assisting with the high school Physics Bowl at SDSU, and a spring trip to Chicago.

The club also carried most of the load in contacting Physics Department alumni during the phonathon.


Hawaiian hobos from the Society of Physics Students show their Hobo Day spirit before the parade October 23, 1999. The chapter has again earned Outstanding Chapter status from its parent organization.

Within the department, the club has a room reserved for its activities. In the room, there is a computer and laser printer that club members can use. Through the computer, students also have direct access to the Internet and various software packages.

Club officers in 1998-99: Michelle Kelly, Burnsville, Minnesota, president; Corey Halstead, Brookings, vice president; Michelle Knuppe, Brookings, treasurer; Tony Harrell, Wagner, secretary.


# Boar-Bot

## Seniors meet need with design

If you were to go to downtown Brookings, or any other city, and ask people "What is a Boar-Bot?" you would get a lot of quizzical looks, but probably not one correct answer.

That's partly because the device is new, having only been created by three agricultural engineering students last spring, and it's partly because most people aren't large-scale swine producers, the people this robot is designed to serve.

But the judges at a prestigious student design competition, sponsored by the American Society of Agricultural Engineers, know what the Boar-Bot is, and who designed it. Last July, in Toronto, they awarded second prize to the team of Joe St. Aubin, Nick Kleinjan, and Jon Roehrl. The team just barely missed taking home first prize.

The need for such a machine was brought to the attention of College of Engineering faculty by swine producer Jerome Mack, who lives near Leola.

The idea was developed by the team of students for their senior design project.

What the Boar-Bot does is perform one simple task extremely well, and in the process it is expected to save swine producers thousands of dollars in labor costs. During a five-year period, the student team estimates it will save Jerome Mack about $35,000. Because the original idea for the Boar-Bot was Mack's, the students will not benefit financially from their work. The Boar-Bot leads, and if necessary pulls, a boar down an alley of a hog gestation barn in front of long row of sows. The sight of the handsome boar stimulates the sows, enabling the swine producer to tell which ones are in heat, and therefore ready to be artificially inseminated. Without the Boar-Bot, two men must parade the 500-pound animal in front of sows, again, and again as new sows are brought into the stalls for several hours each day as the technician works those sows that show signs of heat. At best, this is boring work; at worst, it can be dangerous, especially if the boar is uncooperative or ill-mannered.

But with the aid of the new, remote-controlled, electric vehicle, one man can safely bring the boar down the alley, and still have the time to do the artificial insemination.

At first glance, the Boar-Bot doesn't seem large enough to perform its mission: escorting a 500-pound animal down hog alley. But it must be small enough to maneuver around the narrow lanes and sharp turns of a hog gestation barn.

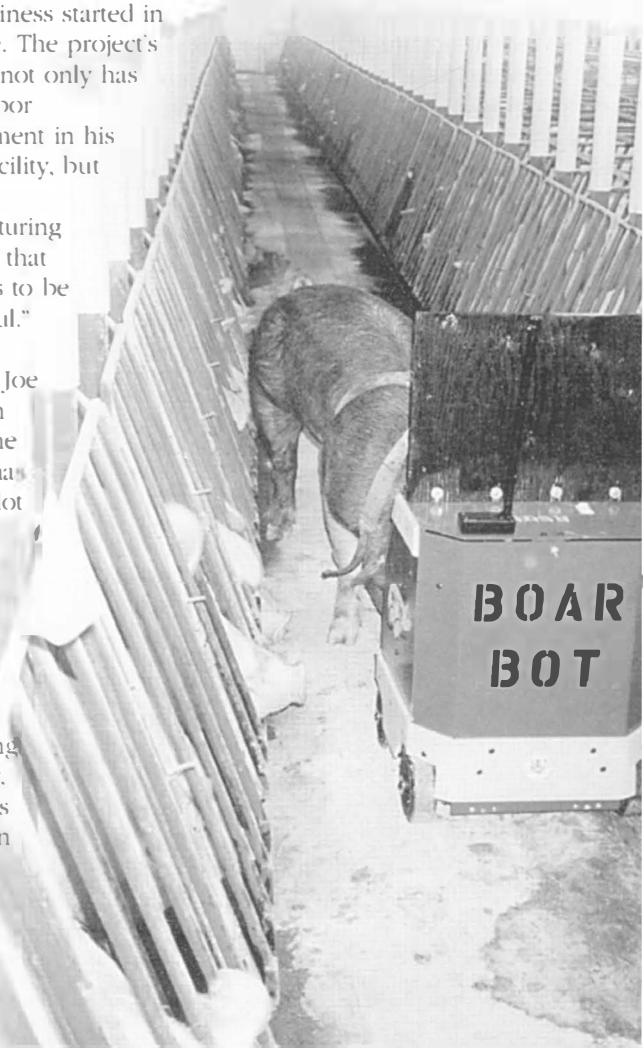
When project sponsor Jerome Mack brought it to last summer's Iowa World Pork Expo, a large swine equipment show, he saw a lot of skepticism from people who didn't think it could handle their boar. But once they were given the chance to grab the rope attached to the moving Boar-Bot, they quickly learned that it was more than up to the job.

Mack was so impressed with the students' work that he has gone into business making Boar-Bots.

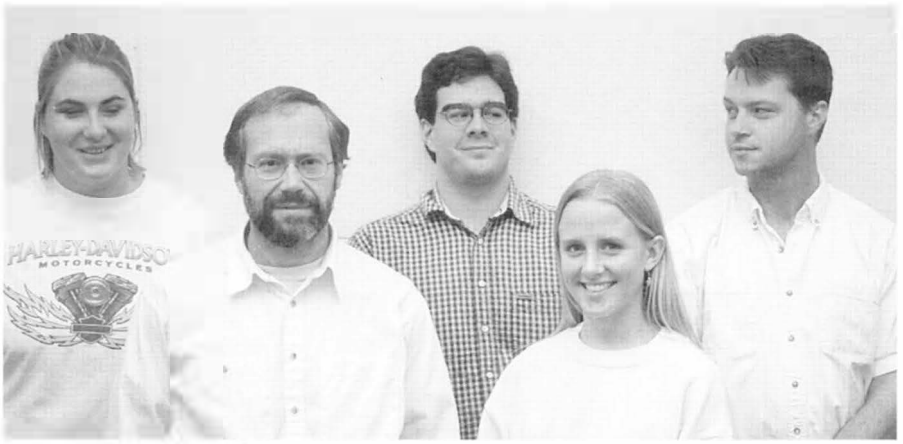
Associate Professor Dan Humburg is the faculty adviser on the project. He couldn't be more pleased with the results.

"It's been a very successful project. The students have gotten excellent experience, and as a result of their work, a new business started in this state. The project's sponsor not only has better labor management in his swine facility, but he has a manufacturing business that promises to be successful."

Team member Joe St. Aubin says, "The project has taken a lot of hard work, twenty hours a week during part of last spring semester, but it has also been a lot of fun."



# A small school success story




This team of electrical engineering students placed second in an International Microelectronics and Packaging Society contest in Chicago. Pictured, back row, from left, are Rachel Quam, Jason Sternhagen, vice president; and Kraig Mitzner, president. In the front row are adviser Dave Galipeau and student Sarah Rensink. Not pictured is Kurt Reddig.

Not intimidated by their small school status, a team of five electrical engineering students placed second at a national conference in Chicago October 25-28, 1999.

The students gave a presentation on the microelectronics program at SDSU and told of the chapter's activities during a brief presentation before judges at the International Microelectronics and Packaging Society gathering. The students' booth also was judged.

In placing second behind the University of Arkansas, the SDSU chapter won $250.

Chapter President Kraig Mitzner says SDSU was the only Division II school among the universities that were competing.

"I talked later with a judge and she said she couldn't tell we were from a small school because we came across so knowledgeable and experienced," says the veteran competitor.

This is the third year that Mitzner and chapter vice president Jason Sternhagen have competed, and the chapter finished second in 1998. But Mitzner insists the credit for the chapter's strong placing should go to its adviser, Dave Galipeau.

"The big thing is Dr. Galipeau. We all do research for him and we have to present for him every week. Presentations have to be professional, just like they're done at the conference, even if it's just a weekly update.

"I think that's the big thing, the way he makes us present. Dr. Galipeau is notorious for what he expects, but we also learn a lot," Mitzner says.

Galipeau says, "The award illustrates the high quality of our students as well as the micro-electronics program at SDSU."

The activities of the ten-student chapter include holding laboratory workshops for fellow students and coordinating a microelectronics lab.

During the conference, the students worked in their booth for three days; they also participated in technical sessions, attended workshops and viewed a display of hardware at the trade show. Some students also took a field trip to a Motorola wireless phone manufacturing plant in Chicago, Galipeau says.

Mitzner, in his first year of grad school, says he found the professional development workshops particularly beneficial. "Some of the theory you hear in class, you see applied."

An added conference benefit is that by "getting to interact with all those professionals, you get to act more like a professional and think like a professional," Mitzner says.

Other team members were Sarah Rensink, Rachel Quam, and Kurt Reddig.

## ■ Student briefs

**Martin Schmidt**, Brookings, received a $500 award from the Schultz-Werth Award Committee for his paper, "Industry in the US: A Model of a Basic System and its Role in Society."

**Laura F. Mehlhaf Stern**, an agricultural engineering student from Menno, received a $2,000 Tau Beta Pi scholarship for her senior year. A total of nine scholars were selected from 100 applicants for the awards given by the national engineering honor society.

**Jessica Berens**, a senior mechanical engineering major from Milbank, received a $1,000 ASME John and Elsie Grasick Scholarship and a $1,000 College of Engineering scholarship. During fall semester she completed an internship at 3M Brookings in the drape converting department. Berens graduates in May 2001.

# Stay-at-home professor

## Internet allows environmental engineer to teach while bonding with children

After having a child, many women take six short weeks off and then return to work. But Suzette Burckhard is not like most women.

When her daughter, Katrina, was born in July, Burckhard was prepared to continue teaching her classes at SDSU while staying home to enjoy her child's first few months.

How? She developed Internet curricula for her environmental geotechnical and hydrology courses.

While Burckhard's students don't physically have to attend class, they are required to complete assignments and check in on the "bulletin board," located on an Internet site accessible from anywhere on the World Wide Web. Burckhard drafted a detailed syllabus and list of assignments, then sat back and waited to see how this method would work.

"It's actually becoming a very popular method of teaching today," she says. "For a variety of reasons, more professors are choosing to teach courses through the Internet."

When Jakob, her first child, arrived seven weeks early, Burckhard had to leave her classes in the middle of the spring semester 1997. As soon as she could, Burckhard brought her son to SDSU and made a sign that read, "It's feeding time. Please come back in 15 minutes. Thanks." By nursing her son in her office throughout the day, Burckhard was able to continue working while ensuring that her son grew to a healthy size.

Yet it wasn't easy.

Students who didn't have experience with babies were often embarrassed to visit Burckhard during such private moments, and frequently went away without asking for help with their homework, she says. In addition, Burckhard discovered that she would soon be sharing her office with another professor, which called for an alternate solution.

Now, with Internet software that provides a "NetTutor" to aid students with equations and technical diagrams on homework assignments, her only worry is that students will forget about her "class" during busy times.

"I've had a few students who have called me and says, 'I'm so sorry! I completely forgot about this class during midterms!' It's hard for them to remember that they do have a class because they're not used to going to a classroom for it, but just sitting down at the computer," she says.

Students who are shy about asking questions or contributing in class would not do well with an Internet class, Burckhard says.

"Just as I would require class participation in my classroom, I do so on the Internet. Students have to make time to log-in to the chat room and contribute to the discussion on the homework, or they don't receive a very good participation grade."

But for the most part, it's the perfect solution. Students turn in their homework on time, post questions in the reserved chat room, and even come to campus during Burckhard's office hours if they need help.

"The majority of my students are doing really well with the Internet courses, which makes me very happy," Burckhard says. "It's great for those students who commute or have family obligations, or just live too far away to attend SDSU but would like to take one of my classes."

In fact, students have responded so well to her Internet courses that Burckhard developed a supplemental web site for her statics class, which she teaches in Crothers Engineering Hall on campus. Students can access her web sites for information on possible jobs, office hours, the class schedule, or to simply chat with other students about homework assignments.

Teaching via Internet also allows Burckhard to be flexible and spend more time with her children, she says. With a playpen in one corner of her office and a computer in the other, Burckhard has found a way to combine the best of both worlds.

Eleanor Baum

# 'Many options open to women'

## First female dean of engineering college offers advice on recruiting and retaining female engineering students

Eleanor Baum has had great success in recruiting more women into the engineering field, and now she has some advice for those who wish to do the same.

An electrical engineer, the dean of engineering at Cooper Union in New York and the first woman to head an engineering college anywhere, Baum spoke at SDSU a few years ago.

In a recent telephone interview, Baum says she believes people's attitudes about traditionally female careers should change with the times.

"In the 1950s, women were only 'allowed' to go into a couple of different jobs: they were either nurses, secretaries, or school teachers," Baum says. "They were expected to do that until they got married, and then they had to give up their jobs to take care of their children and live 'happily ever after.'

"Today, there are many options open to women. There are no longer any societal rules limiting women's lives. Women can be anything they want to now."

The biggest challenge facing women who strive toward a career in engineering today, Baum says, is disapproval from their families.

"A lot of families still aren't comfortable with their daughters going into engineering," she says. "It's a different field, one that is not traditionally female."

Yet Baum believes families will come around if given the right information at the right time.

"Role models are very important," she says. "When colleges such as SDSU go out to high schools to recruit students into engineering, they should use female students in their presentations, and they should present to students, parents, and teachers. That way, students and parents will see that women who choose to go into engineering are not 'weird.' They are pleasant, competent, admirable people. I think that will help to dispel a lot of the myths about women in engineering."

Under Baum's guidance, the female enrollment in engineering at Cooper Union increased from 5 percent to 38 percent. This is not only a benefit to Cooper Union, but also to society and the industry of engineering, Baum says.

"Women are inherently as good in math and science as men are, and we should encourage them to pursue careers in those fields and nurture them once they are in college," she says. "Our economic well-being as a nation really depends on the creativity of our society, on our ability to come up with new products and devices to help the quality of life. If you're excluding half of the population from that process, our nation is really missing out.

"The best growth area in jobs in our nation, predicted by everyone, is in the field of technology. And hey—women should have a piece of that."

Baum is chairwoman of the Board of Governors of the New York Academy of Sciences, and a director of Allegheny Power Systems, the United States Trust Company, and the Avnet Corporation. She is also a past president of the American Society for Engineering Education and the Accreditation Board for Engineering and Technology.

# Browning *doubles up on education honors*

For Larry Browning, 1999 has been a star-struck year.

After being named Teacher of the Year in the spring by the College of Engineering, he was recognized as Educator of the Year by the Brookings Area Chamber of Commerce.

The associate professor of physics was honored November 10, 1999, along with Brookings eighth-grade math teacher Kent Kiepke.

In addition to Browning's work on campus, he annually holds "star parties" for Brookings fifth-graders. During the star-viewing sessions, Browning uses a portable spotlight and some telescopes to point out constellations to elementary students. He also teaches about astronomy at an after-school enrichment program on Fridays at Central Elementary.

"I'm just interested in them appreciating science for their own benefit. I don't want them to grow up and hate science," Browning said.

Kiepke and Browning were chosen by the Chamber's education committee from more than thirty nominees. This year the committee focused on educators who help provide students with learning experiences that aid in the transition from school to the workforce, according to Stephanie Vogel, education community development director for the Chamber.

"Larry's involvement communitywide to educate kids is what made him our choice for the award," Vogel said.

# Center's function not limited to research

Engineers find that water research center can be a base for helping others

College is about learning new information and skills. But is it also about fulfilling a goal to help others?

It is in the College of Engineering, where graduate students are finding that the Northern Great Plains Water Resources Research Center on campus is not only a place where they can turn to learn the latest research methods, but to also create a better way of living.

Established in 1990, the center is designed to enhance the habitability and economic development of the Northern Great Plains through research of the region's vast water and related land resources. In support of this mission, the center strives to meet several goals:

- Conduct research in partnership with technical and nontechnical research;
- Create a center of knowledge and information;
- Focus the disciplines of higher education on water resources research;
- Provide opportunities for academic programs; and
- Participate in cooperative research efforts.

But the center also serves as a research outlet for graduate students. By working on an intense research project with one or more faculty members, graduate students complete their theses and learn a variety of new skills, says Vern Schaefer, center director.

"Intense research projects are good for the students, both personally and professionally," he says. "All research expands students' knowledge and forces them to think critically and expand their horizons. And by doing a thesis from their research, students also improve their writing skills."

And by completing research at the center, students can also help others.

Suzette Burckhard, assistant professor, and Delvin DeBoer, professor of civil and environmental engineering, have worked with many graduate students at the center.

## Research on vegetation in contaminated soils

Continuing research she began as a doctoral student at Kansas State University, Burckhard is studying the use of vegetation to remediate contaminated soils such as those containing mine tailings. Vegetation can prohibit contaminants from spreading, prevents erosion, and visually improves the area, she says.

Daniel Pirkl, who graduated last May, assisted Burckhard with her research and accompanied her to the Fort Riley Military Base in Kansas to meet with local and Environmental Protection Agency officials. In addition, Pirkl learned how to operate machinery frequently used within the

engineering industry. Such skills made Pirkl a more marketable graduate, Burckhard says.

"We can teach students about the science of engineering, but we can't show them how to interact with customers or how to work certain types of machinery without providing the hands-on experience they receive through research," Burckhard says. "Because of their education and intense experience with research, our students leave SDSU with a broad base of communication and operational skills. They are highly sought-after employees."

## Using microfiltration to get clean drinking water

DeBoer works with Tanya Miller, a graduate research assistant from Willmar, Minnesota. In research labs on campus and at the drinking water treatment plant at Fort Thompson, DeBoer and Miller examine the ability of the microfiltration process to remove organisms such as *cryptospiridium* and *giardia* from drinking water on the Crow Creek Indian Reservation in South Dakota. Tiny tubes filter the particles out of the dirty water, and small pumps send the clean water through the distribution system. Miller is also researching methods to minimize the production of carcinogens formed by chlorine and organic matter, which also contaminates water.

By removing a large percentage of these particles, the treatment facility produces clean water that not only meets current drinking water regulations, but also serves as an example for future microfiltration installations. As the first microfiltration plant on the Missouri River in South Dakota, future state engineers could adopt this new and innovative process to complete projects of their own. One day, it may be the preferred process for decontaminating drinking water.

After receiving her bachelor's degree in civil engineering from SDSU in 1998, Miller chose to pursue her master's degree in environmental engineering for one reason: to help others.

"Environmental engineers provide a wonderful service for the public by improving such things as drinking water, and I really want to be a part of that," she says. "Research is all about helping people. I receive a great deal of job satisfaction with my research because I know I am helping people. I also enjoy research because it's a process of self-exploration—I get to see what I'm capable of, first-hand."

Tanya Miller, a graduate student in environmental engineering, tests water samples.

Suzette Burckhard

# Building research used in new building code

Thanks to work by Professor Gary Anderson and research in the Agricultural Engineering Department, a procedure for constructing metal buildings has been approved for inclusion in the 2000 International Building Code.

Engineering Practice 484.2 was developed with extensive input from SDSU and relies on research conducted in the department, Anderson says.

The procedure, for metal-clad, wood-frame rectangular buildings, involves the roof and wall diaphragm strength and stiffness as well as the frame strength and stiffness.

Traditionally, the frame (post and truss) carried the lateral (wind) loads. The recently approved engineering practice distributes the load between the stiff frames and the roof and/or ceiling diaphragm (metal sheeting and lumber frame).

"Contractors are using smaller posts and scaling down the amount of wind bracing in post-frame buildings, which reduce building costs because of engineering innovations. These innovations have led to light-gage metal roof designs that allow the roof to carry the wind load from the top of the posts over to the end walls and down to the ground. The posts don't have to carry as much of the wind force to the ground because the top of the post is supported by the roof," Anderson says.

The International Building Code is expected to eventually take the place of the Uniform Building Code and other regional building codes, Anderson says.

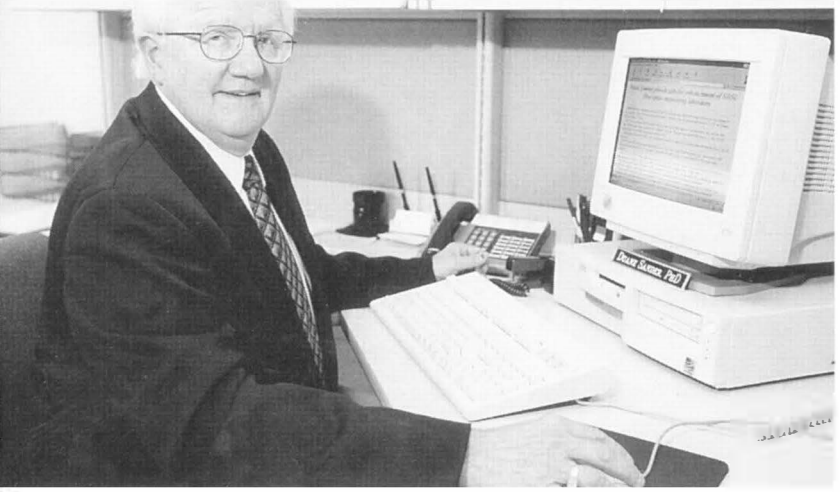
For almost four years, Anderson chaired an American Society of Agricultural Engineers (ASAE) committee that successfully worked to establish an industry standard for metal-sided, wood-framed design.

As chairperson, Anderson coordinated the efforts of a twelve-member committee of engineers from industry and universities. He and David Bohnhoff of the University of Wisconsin did the draft writing for the final engineering practice, which was unanimously accepted by the ASAE Structures and Environment Committee and approved by the American National Standards Institute last spring.

Approval of the design "shows that research conducted at SDSU has implication beyond South Dakota and the region. Diaphragm research conducted in the Agricultural Engineeering Department has national, if not international, impact," Anderson says.

# From dean to director

## Retired dean working as director of special projects with SDSU Foundation



Duane Sander, who stepped down June 30, 1999, as dean of the College of Engineering, didn't go long without a job.

On October 1 he began work as director of special projects at the SDSU Foundation, a private, non-profit corporation working to find private funding sources for the University. Its offices are about one block west of Crothers Engineering Hall, where Sanders served for thirty-two years.

While Sanders' position is new within the Foundation, it is actually a continuation of activities he had as dean, he says.

"I had been working very closely with the Foundation and our alumni. I felt, and the Foundation felt, it was important to maintain those contacts until my replacement is found and the person gets familiar with the College," Sander, says.

Finalists for the dean's post were interviewed this fall.

Sander, 61, expects to stay in his new full-time position for two years.

In preparation for his work on special projects, Sander is meeting with retired faculty members who have stayed in contact with a number of alumni. One of his first projects is to outline and implement an entrepreneur program designed to keep graduates in South Dakota.

A series of alumni gatherings during the spring of 1998 helped Sander prepare the ground for his Foundation work.

Accompanied by noted alum Jerry Lohr, '58 civil engineering, Sander met with alumni in Minneapolis and Denver.

"We've developed a network of alumni who are willing to help us raise funds for our different projects in the College of Engineering. There have also been a number of contacts made with other colleges. I look forward to having more time to visit with alumni as well as work with local and regional industries," Sander says.

Says David F. Marquardt, Foundation executive director, "The SDSU Foundation is fortunate to have Duane Sander join the staff and share his insight from his experience of being both a longtime SDSU educator and administrator. We are very excited about his joining the Foundation staff as director of special projects."

The former dean began his career at SDSU as a professor of electrical engineering, and then served as head of the General Engineering Department from 1985 to 1987, when he became acting dean and later dean. Sander also was a co-founder of Daktronics, the Brookings-based scoreboard manufacturing giant.

Between jobs with the College and the Foundation, Sander did find some time for leisure.

The Sanders took a three-week trip to Australia, and continued restoration work on his wife's childhood home in Lead.

# Kurtenbach, Ellerbruch

## *to serve as co-deans*

Aelred Kurtenbach

Virgil Ellerbruch

Aelred Kurtenbach, CEO of Daktronics Inc. in Brookings, and Virgil Ellerbruch, professor and acting dean of Engineering, will serve as co-deans of Engineering for the next eighteen months to two years.

Kurtenbach will assume the external affairs of the College, including building projects, the Polytechnic Center of Excellence, the restoration of Solberg Hall, Foundation-related business, and fundraising. Ellerbruch will take the responsibility for the internal affairs of the College, including teaching and advising students, coordination of the High School Visitors Team and dealing with administrative issues regarding academic programs.

"We are very excited about this arrangement," said Carol J. Peterson, vice president for Academic Affairs. "With Dr. Kurtenbach helping us with external projects and Dr. Ellerbruch's talents on the inside, the College will be in the very best of hands. We're extremely pleased that these two exceptionally well qualified individuals have agreed to undertake these responsibilities."

Vice President Peterson indicated that recruitment for a permanent dean will resume next fall, with the goal of filling the position between July and September 2001.

# What's New?

**Salah H. Al-Tamimi (civil engineering '85, '87)** has marked the first anniversary of his promotion to Development Branch Projects Engineer for the South Central Region of the Washington State Department of Transportation in Yakima. He also is serving on a statewide Managing Project Delivery team that is in the process of enhancing design procedures for the transportation department. Al-Tamini and his wife are the parents of three children, Hammed, 10; Siham, 7; and Noor, 6.

**Marty Christensen (mechanical engineering '94)** passed his PE exam to become a licensed South Dakota engineer in October 1998. He has worked for West Plains Engineering in Sioux Falls since his graduation. Christensen and his wife, Tammy (Sagness '94) had their first child on October 8, 1999—a girl, Alexis Danae.

**Arthur Helma (mechanical '50)** is retired in Aurora, Colorado, after a thirty-five-year career in engineering. His career included four years at Martin Marietta in Denver, where he worked on the moon shot missile, the launch pad, and other space projects.

**John Kappenman (electrical engineering '76)** has been named division manager of Metitec of Duluth, Minnesota, which does advanced space weather forecasting.

**Donald Sours (electrical engineering '44)** retired from Control Data (Ciridion) in 1987 and moved back to the Twin Cities to be with children and grandchildren. In May 1999 the Sours moved to Rose Pointe, an independent living, apartment community in Roseville, Minnesota.

**Brian Steward (electrical engineering '89)** has completed his doctorate in agricultural engineering at the University of Illinois, Urbana-Champaign, and is teaching at Iowa State University in Ames. Benjamin Arthur joined the Steward family on June 15, 1999. His brother, Timothy Anthony, is two.

**Lt. Gen. Lanny Trapp (electrical engineering '69)** is finishing his tenure as 12th Air Force Commander at Davis Monthan Air Force Base, Tucson, Arizona. He was responsible for eight air wings as well as operations in Central and South America. He will be moving to Hickman AFB, Honolulu, Hawaii, to be vice commander of the Pacific Air Forces. He is married to the former Nancy Eneboe ('68 USD).

**Brian Weiss (BS civil engineering '94, MS engineering '98)** is an environmental engineer with Advanced Engineering, Grand Forks. His wife, Richel (Tschetter) Weiss '95, is a registered nurse in the rehab department of Altru Health System. The couple's first child, Miranda Jo, was born June 16, 1999. Brian completed his master's degree in December 1998.

**Retired Col. Dennis York (electrical engineering '60)** is serving as the mayor of Lead, where he conceived the budget-saving measure of having all City Hall employees do their own cleaning. York, originally of Sioux Falls, and twenty-five full-time workers are saving $12,000 per year by doing the work themselves.

## *We want to* **hear** *from you!*

Have you moved, accepted a new position, gotten married, given talks in your community, received an advanced degree, or had an addition to your family? All of us at the College of Engineering, along with your classmates, want to know what has been happening with you.

Name_____ Year Graduated_____

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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 the achievements of our faculty and students.

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# Haunted House

For the fourth straight year, Sigma Phi Delta engineering fraternity organized a two-day haunted house at the University Mall. The house project, overseen by Bob Young, attracted several hundred people and included the addition of a spinning vortex.