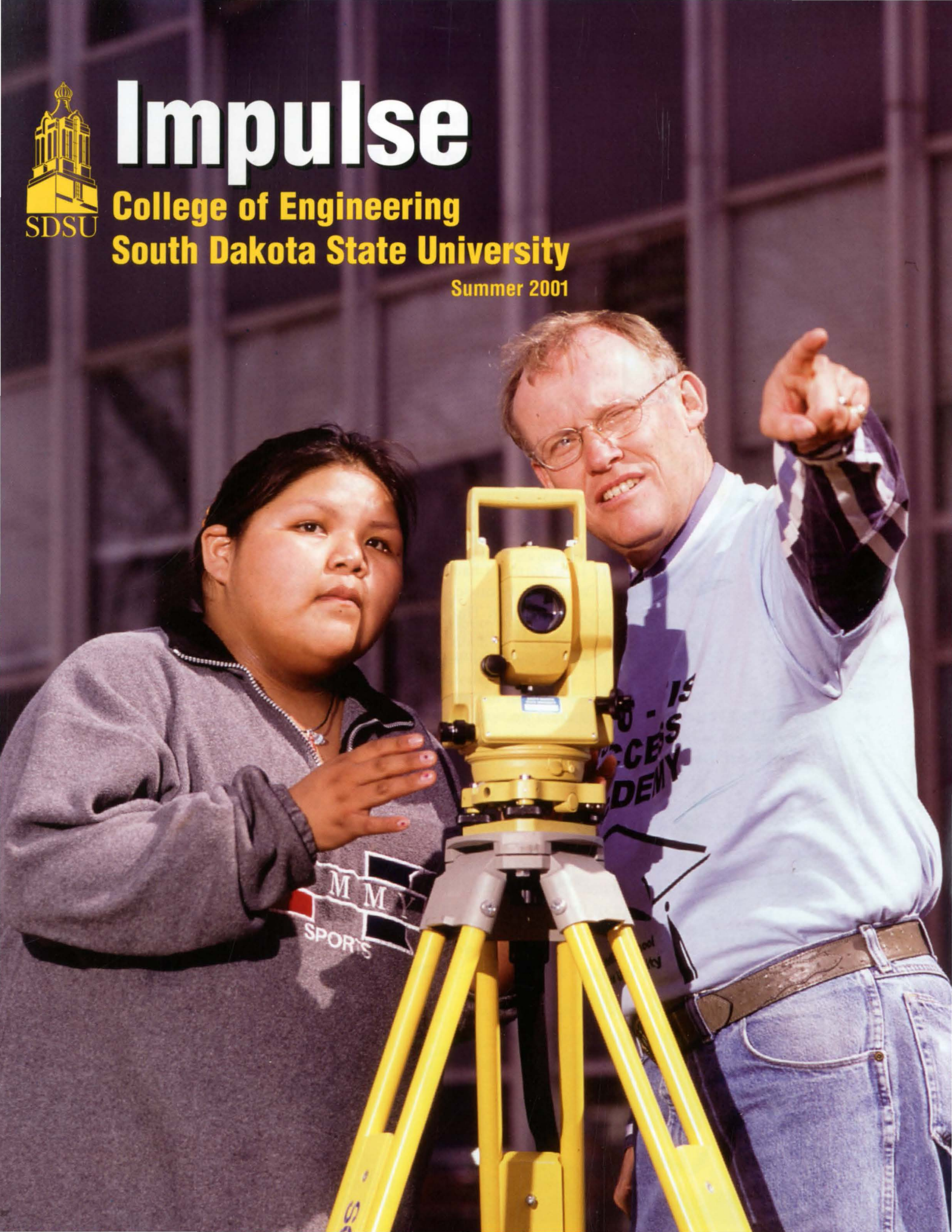

# Impulse

## College of Engineering
## South Dakota State University

Summer 2001

# Dear *alumni and friends*

As I retire I want you to know that the people at South Dakota State University, the administration, the staff, the students, and the faculty have always inspired my thinking. SDSU has been a great place to spend a career.

Did I see all the things accomplished that I had visualized? No! Did I see accomplishments that I had not dreamed would happen? Yes!

The addition and renovation of Crothers Engineering Hall and the reconstruction of Solberg Hall fall into the latter category. A few short years ago I did not believe that these two projects would happen in my tenure at SDSU. Thanks to many of you who are the alumni and friends of SDSU, these projects are funded and in progress.

Thanks to Jerry Lohr, former Chair of the SDSU Foundation and the *Visions for the Future* Campaign. Because of Jerry's untiring efforts many things on this campus became a reality. Through Jerry's leadership, perseverance and determination, many of you were inspired to open your hearts and resources to the needs of the College of Engineering.

To those who remembered me in writing on the event of my retirement, thanks! Your kind thoughts will remain with me forever. At this time I do reflect on all those who have gone on before and know that this College was made better because of them. I firmly believe we have the personnel in place to continue the process of education, research and outreach in the land-grant tradition. That makes me feel very good as I continue my life with other interesting things to do.

Thanks to all for your continuing support of the College of Engineering and its programs. I will continue to watch with pride the education and achievement of those associated with the College of Engineering at South Dakota State University.

To Barb, LaVonne and everyone—THANKS!!

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

Choir reaches Europe thanks to civil engineering graduate. Page 28

Mechanical engineer competes for Miss South Dakota title. Page 14

## About the cover

Associate Professor Chuck Tiltrum helps Tanessa Wescogame spot a target to site in with a self-leveling tripod level at an FIS Success Academy workshop April 20. The event project brought 100 Flandreau Indian School freshmen to campus six times in the spring semester.

See story on page 2.

Cover photo by Eric Landwehr.


## Impulse

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PEGGY GORDON ELLIOTT/SDSU president

DAVE GRAVES/editor

KRISTI SCHELHAAS/graphic design

DAVE GRAVES,
KYLE JOHNSON,
MARIAH NELSON/contributing writers

DAVE GRAVES,
KYLE JOHNSON,
MARIAH NELSON,
ERIC LANDWEHR/photography

NAN STEINLEY/publications editor

SOUTH DAKOTA STATE UNIVERSITY
Office of University Relations
Communications Center
Brookings, SD 57007-1498
605/688-6161


# Impulse

**College of Engineering, South Dakota State University**

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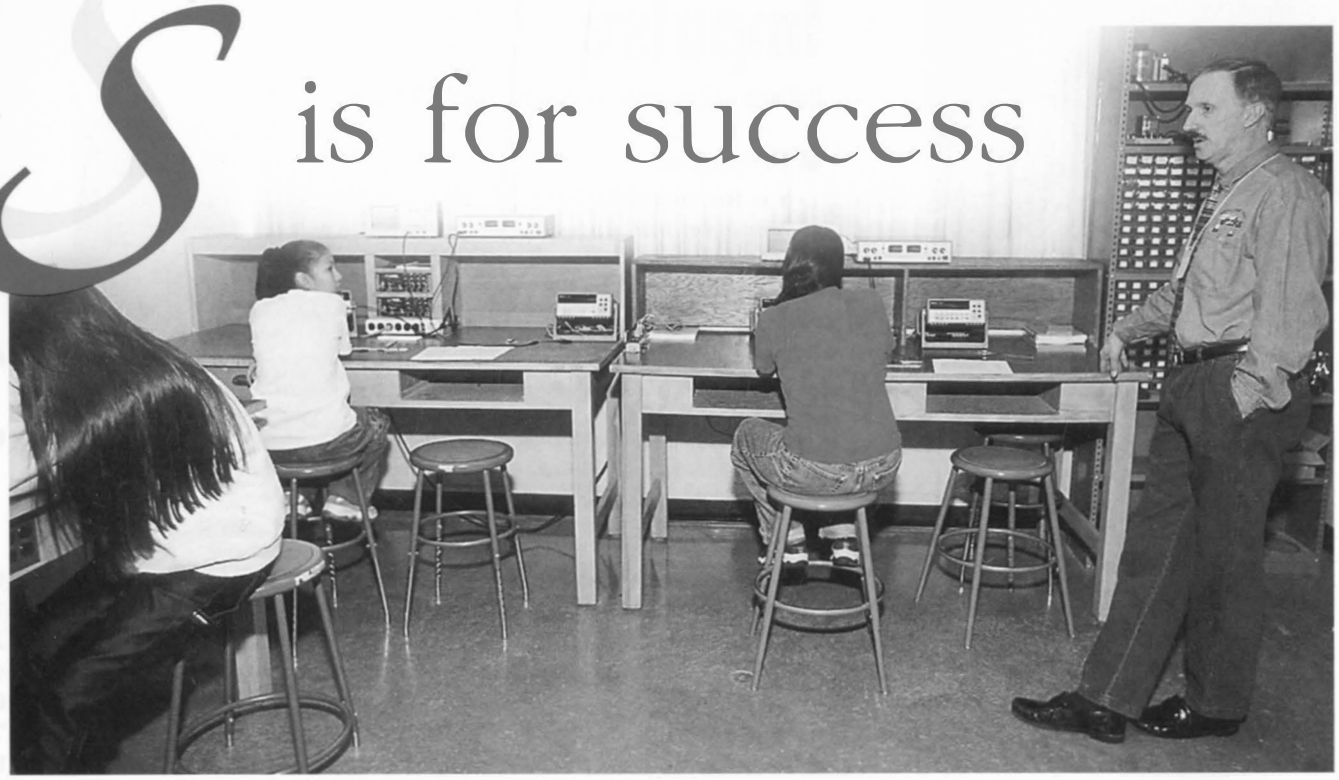
# S is for success



Flandreau Indian School students operate oscilloscopes while listening to Lew Brown, head of the Electrical Engineering Department, in a lab in Crothers Hall this spring.

*New effort introduces Native American teens to college opportunities*

The students can't wait to get started. They're turning the dial on the oscilloscope before instructor Lew Brown is done talking.

With a twist of the frequency knob, the amplitude reading jumps and light emitting diodes (LEDs) power on. Working in a basement lab of Crothers Engineering Hall, these freshmen show an inquisitiveness that arcs from one demonstration to the next.

It is the second group Brown, the Electrical Engineering Department head, has worked with on this Friday afternoon in April, the final session of an inaugural effort.

The students attend Flandreau Indian School, about twenty-five miles from the Brookings campus. For most of these 14- and 15-year-olds, the University campus was located in another world when the SDSU-Flandreau Indian School Success Academy started in January.

College wasn't on the radar screen for many of the class's 100 members, who come to the off-reservation high school from throughout the nation. Tanessa Wescogame lives in the bottom of the Grand Canyon, where it is a four-hour walk to reach an Arizona highway.

She enjoys science, and an interest in architecture now has her thinking about college.

## • An idea bears fruit

One aim of FIS Success Academy is to encourage more Native American students to consider college while cultivating a sense of familiarity with the SDSU campus. The project is an effort of the College and the Indian School with extensive cooperation from the University's other colleges.

The idea for a program between FIS and the College had been discussed for about a year before plans came to fruition. In August 2000, MaryJo Benton Lee, diversity coordinator for the College, received a call from her FIS contact, Susan Mendelsohn, a teacher and member of the school's reform committee.

Mendelsohn reported to Lee that the Flandreau school was ready to implement the school reform plan it had been developing.

"FIS had a way we could partner with them if we were interested. It was their idea to bring their entire freshman class to the College of Engineering six times," Lee recalls.

Lee discussed the proposed plan with Dean Virgil Ellerbruch. Both were "delighted" and "overwhelmed" at the idea. They decided to seek the advice of five campus colleagues who had long track records of successfully working with Native American high school students.

The response received from these colleagues was overwhelmingly enthusiastic. Thus, other colleges were brought into the planning, which focused on short workshops in the afternoon with a meal and a campus event in the evening.

Teachers and officials from SDSU and Flandreau Indian School met in November 2000 and the opening workshops were January 26.

During the six visits, workshops were conducted in engineering, nursing, journalism, food science, sociology, agriculture, and biological sciences.

## • First-year results first rate

Rick Drennen, in his twenty-first year of teaching at the Indian School, says, "When we started, the students were pretty apprehensive. By the time we were done with it [April 20], they

knew what to expect and they were looking forward to the fun workshops. It was a real success."

Lee gave an enthusiastic assessment of the program.

"Having the students here with us for six Fridays—to study with us, eat with us, and have fun with us—was a wonderful opportunity. We're all learning from each other," she says.

Brown, who became dean on July 1 said after his final FIS workshop, "From Day One, this has been a learning experience for me. For ten years I've been doing summer camps for kids. These FIS kids are like virtually every group. They come in and you don't know if they're listening or not.

"But by the time they leave, they're engaged in the equipment. We're planting some seeds in these kids that I think will result in some future engineers and scientists."

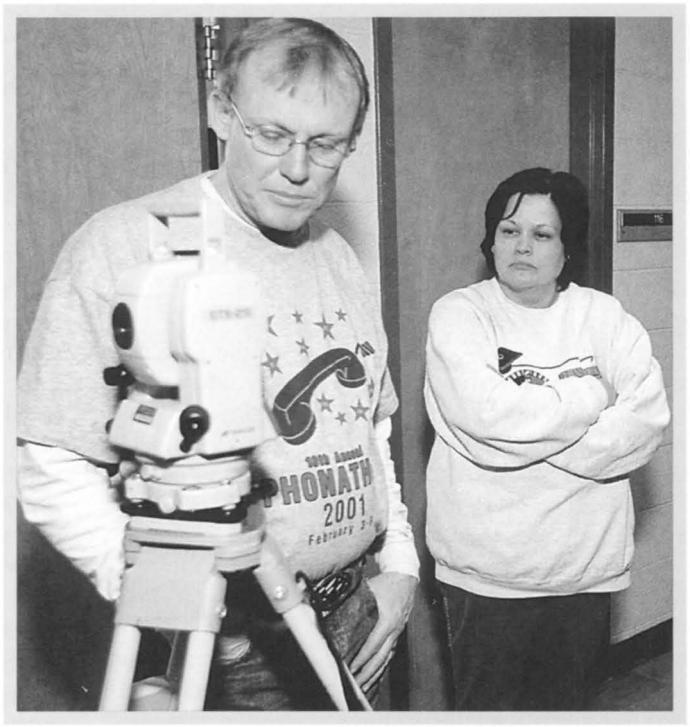
Judging from their written comments, the students also enjoyed Success Academy.

*"Thank you, SDSU, for the great experience. If it wasn't for SDSU, I probably wouldn't know how college would be in the future. If I'm lucky I will see you at the college when I graduate. I really liked the program you showed us. I learned some good things I didn't know before, so thank you for the great experience.*

*"I wish we didn't have to stop going there, but it's the end of the school year. Sincerely yours, Brian Tepiew."*

Marni Cecelia Waupekenay writes, *"I have enjoyed the times I have spent over at the College. All of the staff made me feel welcome."*

Good food was frequently cited in the students' comments as were the basketball game and rodeo that the students attended, Lee says.




Associate Professor Chuck Tiltrum explains a self-leveling tripod level at one of this spring's FIS Success Academy workshops.

## • Future hinges on funding

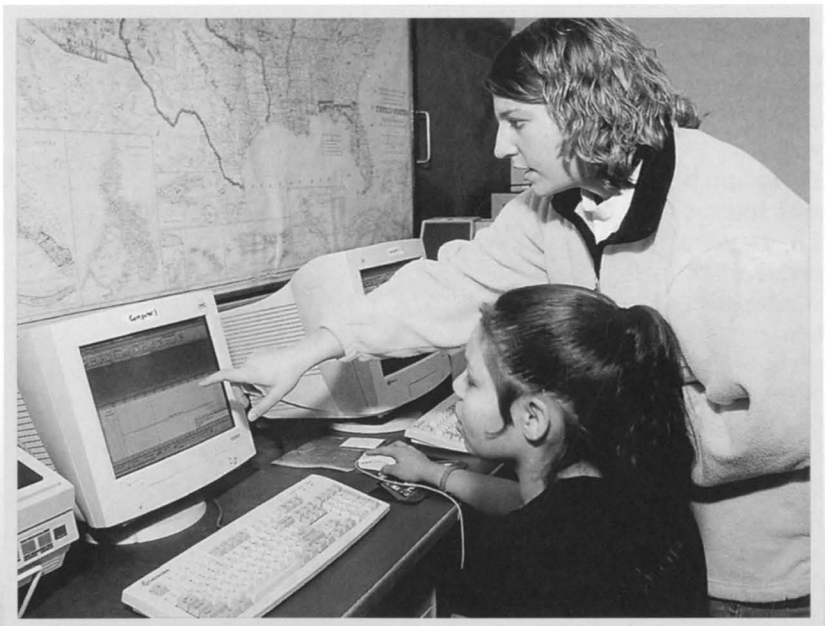
Organizers at SDSU and FIS hope to continue Success Academy with next year's freshman and sophomore classes, and, during the next two years, expand the program to also include juniors and seniors. But that will depend on funding.

This year the support came largely from the University Diversity Council and in-kind contributions by SDSU's seven colleges. The College of Engineering administered Success Academy with Lee as its coordinator. Indian School expenses included bus transportation and teacher overtime.

## • Club key to FIS success

Lee was pleased with the Academy's format, which included use of Native American Club members as mentors.

"The Native American Club was a mainstay of this program. From picking the FIS students up at the bus, to eating meals with them, to seeing them off, the club members were hugely important," Lee credits.



Erin Richter, a civil and environmental engineering student, helps a Flandreau Indian School student with West Point Bridge design software.

# New leader

## *SDSU educator brings varied experience to dean's office*

"Lew can keep your car running good."

No, Lewis F. Brown, 47, did not include that line from a 1976 newspaper ad in his application for deanship of the College of Engineering. But SDSU's newest dean did take with him the experience gained from running his own auto and electronics repair shop for fifteen months in the tiny South Dakota town of Oldham.

The transplanted South Dakotan also carted along his experience in plumbing and grounds maintenance. And "I've done more fast-food work than anybody. After I graduated from high school [in Colorado Springs], I thought my future was in restaurants."

It turned out that Brown's future was in electrical engineering. During a four-year stay in the industry, he wrote two scientific patents in the field. During his nine years at SDSU, Brown has given scientific lectures at every major international symposium in his research area—ferroelectric materials and sensor devices.

But time spent flipping burgers, tuning carburetors, and repairing faucets weren't years shaved off an illustrious career.

"I find that background experience is very useful. . . . All of those things have given me a real broad experience with people that I think will be real useful as a dean," Brown says from his Harding Hall office in the weeks before he takes the post that Virgil Ellerbruch and Aelred Kurtenbach have shared the last two years.

### • Quiet leadership

Brown served as head of the Electrical Engineering Department and interim head of the Computer Science Department before he officially took the College's reins July 1.

He was chosen in mid-April from a field of twenty-five candidates, five of whom had on-campus interviews.

Danny Lattin, search committee chair, says Brown "impressed me with having a vision for the College of Engineering and ideas for working with faculty and staff to effect that vision. I'm struck by the fact that in a quiet and unassuming way, he's a leader. And he's respected in the state for his professional abilities as an engineer and an educator."

Those qualities weren't enough to prompt the College's 1995 Teacher of the Year to apply for deanship when Duane Sander retired on June 30, 1999, after thirty-two years with the College.

### • Connecting to students

"I couldn't imagine myself leaving the classroom and the student contact. That was unacceptable. After the first job search failed and the second search was well under way, I had five administrators encourage me to apply. I talked with other deans on campus about how they maintained student contact.

"In late August [2000] I submitted my package and I've been excited about it ever since," Brown says in a voice still colored by excitement.

Part of that is because of the opportunity to step up to a new set of opportunities and challenges. Part of that is because Brown no longer views deanship as administrative isolation. He plans to stay in contact with students through the Joint Engineering Council, which serves in an advisory role for the dean; summer orientation for freshmen; TGIF, which brings high school visitors to campus on many Fridays; and meeting with engineering honor societies.

And "I haven't ruled out some classroom teaching—overseeing student design and independent study projects," Brown says.

### • Corporation collaboration

But he realizes his primary responsibility is in directing the College's 150 faculty and staff to continue to provide an outstanding education for its 1,260 students and to broaden and enhance the research and technological opportunities the College can offer them.

The answer to the later priority lies in a much closer relationship with industry in eastern South Dakota, says Brown, whose dark eyes brighten with ideas. "We need to be a part of the future plans of any high-tech company in eastern South Dakota that exists or will develop."

Strong collaboration means internship opportunities for students, more real-world experience that faculty can introduce to the classroom, more students with an interest in working in this area, and continuing education opportunities for those in industry. "There are lots of benefits for all parties," Brown summarizes.

He adds that "hiring for high-tech graduates is very competitive. . . . When I graduated from here almost twenty years ago [1984] there were very few opportunities in eastern South Dakota. Now, I could place all of my [thirty-six] electrical engineering grads in eastern South Dakota, if they were only willing to stay."

Brown began his collaborative efforts in March, when advisory boards for the Electrical Engineering and Computer Science Departments were formed.

Each fourteen-member board is comprised of twelve engineering and manufacturing firms in the region that hire most of the departments' graduates. "They're people we can trust when we call and ask what does an engineer need to have to work for you," Brown says.

He expects the College's other departments to also add industry advisory boards.

"As a land-grant institution, it's our business to serve local and regional industry. That is our mission."

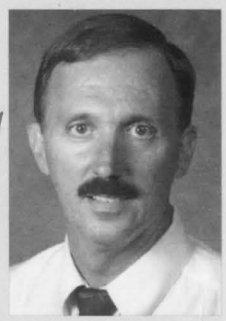
### • Dad's advice

Taking on the role of dean, Brown will find a lot of different missions: preparing the College for an accreditation visit in 2003, recruiting top students, enlisting donors, overseeing construction at Crothers and Solberg Halls, and battling with the budget.

But Brown, who still has the 1955 Ford pickup he used as an auto mechanic in Oldham, also still holds to the advice of his military father.

"My dad told me to do the best job you can for your employer, whether you're digging ditches or installing communication devices, and you'll be a success."

## Lew **BROWN**



*Dean — College of Engineering*

**Education**

*Doctorate* — Electrical engineering, biomedical engineering. Iowa State University, 1988.

*Master of science* — Electrical engineering with a minor in biomedical engineering, Iowa State University, 1986.

*Bachelor of science* — Electrical engineering with highest honors, South Dakota State University, 1984. Minors in math, computer science.

**Professional experience**

*January 1992 to June 30, 2001*
Electrical Engineering Dept., SDSU (head since July '93).
Computer Science Dept., SDSU (acting head since July '00).

*July 1988 to January 1992*
Senior research scientist and technical manager, Atochem Senors (formerly Pennwalt Corporation), Valley Forge, Pennsylvania.

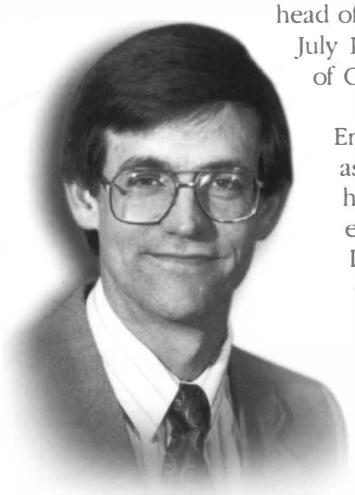
**Personal**

Wife — Danelle, an Oldham farm girl.
Children — Four daughters, ages 15 to 22.
Resident of White.
Member of the Deubrook School Board since 1997.
Born in Arlington, Virginia, but lived there only nine months.

# Helder, Salehnia *named acting department heads*

Two veteran professors at South Dakota State University have been selected as acting department heads in the College of Engineering.

Alireza "Ali" Salehnia assumes his role in Computer Science; Dennis Helder will be leading the Department of Electrical Engineering. The appointments are effective July 1, and coincide with the advancement of Lewis Brown to dean of the College.



Dennis Helder

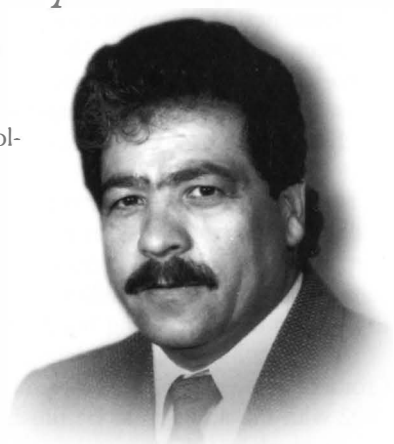
Brown has served as department head of Electrical Engineering since July 1993 and acting department head of Computer Science since July 2000.

Helder, 43, joined the Electrical Engineering Department as assistant professor in 1988. In 1988 he completed his doctorate in electrical engineering at North Dakota State University. Raised in Canton, Helder completed his bachelor's and master's degree in electrical engineering at SDSU in 1980 and 1985.

He has been director of research for the College of Engineering since 1998.

Helder has been active in the research of satellite image processing, and the development of new ethanol-based aviation fuels.

Helder and his wife, Susan, live near De Smet. They have five children.



Ali Salehnia

Salehnia, 49, joined the SDSU Computer Science Department in 1989. He has been active in the research of management information systems, expert systems, and database systems.

Salehnia is the coordinator of the SDSU-IBM *Partners in Education* program.

He holds a doctorate in technology teaching from the University of Missouri and has done graduate work at the University of Oklahoma. He received his master's of business administration from Central State University in Edmond, Okla., and a bachelor's degree in cost accounting from the Iranian Institute of Advanced Accounting in Tehran.

He and his wife, Zahra (Zari) live in Brookings. They have two children.

# Crescendo at Crothers

*Engineering hall being renovated, expanded in $7 million effort . . . work to be done by next summer*

President Peggy Gordon Elliott calls it "the best tradition" of giving back and ensuring that the education excellence of today remains for the next generation.

Elliott led groundbreaking ceremonies May 18 for a 25,000-square-foot addition to the southeast corner of Crothers Engineering Hall.

"It's the good work of true believers and the good work of the sons and daughters of South Dakota State," says Elliott, referring to fund raising efforts of the College's alumni and friends. "What a wonderful thing they have done in making sure the quality of education that helped them achieve and rise in their profession continues for the young people of today and far into the future."

Designed by the Sioux Falls architectural firm of Koch, Hazard and Baltzer, the three-story expansion will house laboratories for civil engineering, mechanical engineering, electrical engineering, and physics.

Fund raising efforts for the new addition netted $3.2 million from corporations, alumni, and friends. The state contributed $3.75 million for the renovation of the existing building.

Plans call for the remodeling of Crothers to be completed by summer 2002 with the addition to be finished this December.

"I thank the students, present, past, and future," says Virgil Ellerbruch, who retired as dean of the College June 30 after thirty-four years of service to SDSU. "Without the help of our alumni and friends, and the state of South Dakota, we would not be able to build the addition or renovate Crothers."

Named after Dr. Harold Marion Crothers, dean from 1925 to 1955, Crothers Engineering Hall officially opened its doors in 1957-58. Now, after many years of producing some of the top engineering minds in the country, the Hall's expansion addresses space problems that have concerned the staff for a long time.

"I never thought this would happen during my career here," notes Ellerbruch. "I wasn't sure we would get it going before I retired. Then, all of a sudden, it came together and started happening. We've been tight for space. This is what we need."

Besides the new addition, a one-story, glass-enclosed entryway with double doors will be added to the east end of the current building. Stretching sixty feet long and thirty feet across, the entrance will serve as a research and study area for students.

An elevator tower, large enough to transport heavy equipment and machines, will be constructed on the northeast corner of Crothers.

## New inside

The current building will get an interior facelift with upgrades in heating, wiring, lighting, and fire exit and safety codes. In addition, a breath of fresh air will fill the building with the installation of a central air conditioning system for the first time.

The renovation will also meet the requirements of the American Disabilities Act. "That's always been a concern," points out Ellerbruch. "The elevator will make the building totally accessible for people in wheelchairs or on crutches."

Some of the new labs will be shared, including the high-bay structures laboratory, which benefits not only civil and mechanical engineering, but also the ag and biosystems engineering and technology programs. The lab will feature a twenty four-foot clearance to allow for testing of large structural pieces of material.

"Now we have the capability to bring in big beams and test them structurally," observes Ellerbruch. "That's something we've wanted to do for years."

## Civil & Environmental Engineering

Each arm of engineering will feel the improvements in different ways. For example, the extra room means the environmental and water quality labs will be able to move from their off-campus location north of the Brookings Multiplex to Crothers .

"It's the best thing to happen in the department in two decades," says Vernon Schaefer, head of Civil and Environmental Engineering. "We're getting new labs and our current ones will be remodeled and enlarged to

Turning dirt at the Crothers Engineering Hall groundbreaking are, from left, Dean Virgil Ellerbruch, Brad Hakeman, president of the Joint Engineering Council; President Peggy Gordon Elliott, incoming Dean Lew Brown, retired Dean Duane Sander, Dean Aelred Kurtenbach; and alumnus Jerome Lohr, representing the SDSU Foundation.

accommodate more students. For us, it's going to be a tremendous improvement."

## Physics

Oren Quist, professor and head of the Physics Department, is looking forward to using the space for equipment and experiments.

"It allows for student projects and faculty projects in a dedicated place," explains Quist. "Right now, space is limited and it's difficult for labs, student projects, and faculty research to function at the same location."

The scanning electron microscope, now in the nuclear laboratory, will move to the addition. "It's in a very inconvenient place to work on," says Quist. "We can't leave it there due to restrictions on what can be stored in the nuclear lab."

Equipment like the sputtering system, a high tech vacuum deposition system belonging to SDSU and currently used off-campus at MTR, Inc. of Brookings, can stay on campus. "Convenience and location is a good example of where the new space will make life better for everyone," notes Quist.

Two robotic telescopes will be on the roof of the existing building with its Internet control system in the addition. "My goal has always been to sight them on top of the building," remarks Quist. "With the space in the new lab, students, faculty, and anyone having access to the Internet, can reserve time on the telescopes and use them remotely over the Internet. This should be particularly useful to high schools throughout the state."

Another device, the heliostat, which tracks and measures the sun, will be attached to the roof. The new lab on the third floor will contain the control system.

## Mechanical Engineering

For Don Froehlich, professor and head of Mechanical Engineering, the addition means relief for the department's "two key labs" on the first floor, the measurements and instrumentation lab, and the dynamic systems lab.

"Getting the new addition and building renovation is a real plus," he says. "It's truly exciting. It's an expansion by taking current systems and putting them into a brand new lab. It's a real opportunity for us to look at what we use in labs, from top to bottom."

## Electrical Engineering

The Electrical Engineering Department will trade outdated equipment and rooms on the first floor of Crothers for state-of-the-art equipment in the new addition, according to Lewis Brown, professor, head of Electrical Engineering and, as of July 1, the new College dean.

Brown says the addition would have a major impact on the overall program because students will have access to equipment used in the field.

"Instruments can roll right into the classroom. We will replace instruments dating back to 1957 and 1958. The new technology will become part of a core curriculum that will better educate students in preparing them for the real world."

## Photos track Crothers Addition

A month-by-month photo journal of the expansion of Crothers Engineering Hall can be found on the College of Engineering web page. Go to www3.sdstate.edu/Academics/CollegeOfEngineering/ and scroll to the bottom of the page.

# Engineering landmark

## *gets special treatment with renovation*

The sound of students scurrying for their next lecture or laboratory exercise will once again permeate the second oldest building on campus.

Solberg Hall, the primary engineering building for more than fifty years before the construction of Crothers Engineering Hall in 1957, is the target of a major renovation project that will commence during the spring of 2002.


Fund raising for the nearly $4 million project is continuing through the SDSU Foundation. Gifts received to date include cash donations, corporate gifts, estate gifts, and the sale of equipment and historic collections.

Sioux Falls Construction Company was hired to repair the 100-year-old building. The exterior's brick and stone facade will be tuck-pointed with mortar joints replaced as necessary. The inside will be completely gutted and rebuilt. New heating, air conditioning, and electrical systems will be installed. In addition, the building will meet current fire exit and safety codes along with being handicapped accessible for the first time.

Solberg Hall has been the foundation building for much of the long and storied history of the College. Thousands of SDSU engineers received their engineering education within its walls. Many, like Jack Marshman '55, have made significant contributions to the engineering profession.

As chairman of the board of Sioux Falls Construction, Marshman has an opportunity to direct his engineering talents to a building that was the cornerstone of his education.

"I attended all my engineering classes there," says Marshman, a civil engineering graduate. "It's going to be fun bringing it back to life. It's a nice building with some great architectural features to it, but the inside is inadequate structurally. It's in need of some major repairs."

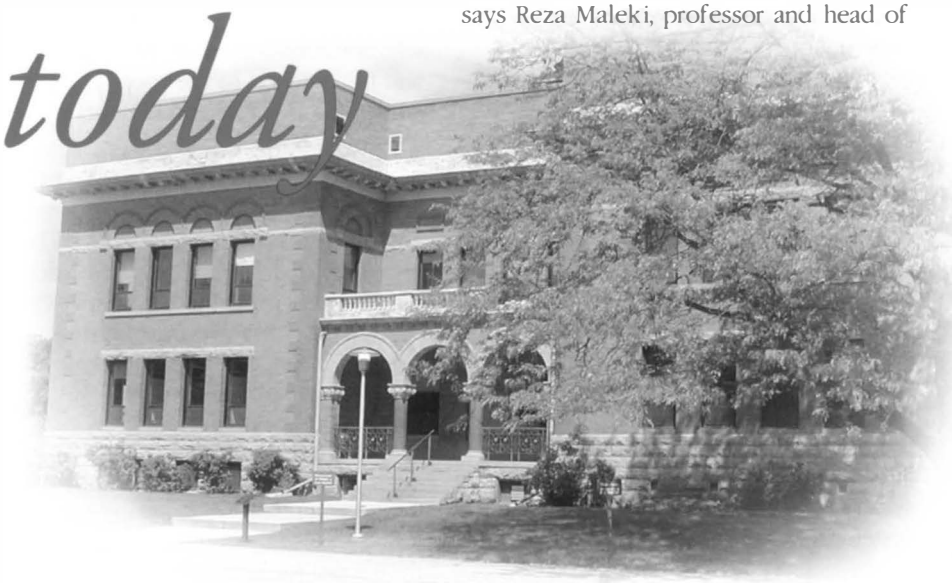
Marshman notes it makes sense to fix Solberg Hall so faculty and students are under the same roof.

"What really caught my attention was the way the technology programs are currently scattered in different locations on campus," he says. "It's a natural development to consolidate programs in one building. I would call it a really good marriage to have a new Solberg Hall adjacent to Crothers."

The College and other university departments used Solberg Hall for classrooms, laboratories and offices from 1957 until it was closed in November 1998. Following a structural analysis by Banner and Associates of Brookings, the building was found to be in poor shape, particularly the roof, floors, beams, and interior walls. With the structure unsafe and incapable of supporting necessary loads, the building was condemned and occupants were forced to relocate.

The Department of Engineering Technology and Management was hardest hit. Its thirteen faculty members and support staff moved to offices around campus. Faculty offices, classrooms, and laboratories are now located in six different locations: Solberg Hall annex, United Ministry, Hansen Hall, Wecota Hall, Wenona Hall, and Crothers Hall.

"Not only have the instructors been affected, but students are forced to travel across campus to various buildings for classes and lab exercises," says Reza Maleki, professor and head of



the Department of Engineering Technology and Management.

Maleki says a new Solberg Hall will provide much needed support to the department's growing programs, including construction management, electronics engineering technology, and manufacturing engineering technology.

"One of the most important things is to have the entire faculty together and centrally located in a building that provides state-of-the-art classrooms and laboratories for students and faculty," points out Maleki. "A reconstructed Solberg will also be a great recruiting tool and a place at SDSU for the interaction between industry and academia."

Maleki adds that by having Solberg and Crothers concentrated on the southwest corner of campus, it allows all the College's engineering departments to share resources.

Solberg Hall's new basement will house laboratory and classroom space for the manufacturing engineering technology program. The Great Plains Rapid Prototyping Consortium, an applied research center assisting South Dakota companies with quick production of prototype products, will also find a home in the basement after operating out of the Brookings Economic Development Corporation.

The first floor or multidisciplinary level will consist of the department head's office, a conference room, an engineering hall of fame, and faculty offices for manufacturing engineering technology.

Classrooms and faculty offices for electrical engineering technology, and construction management will be located on the second and third floors.

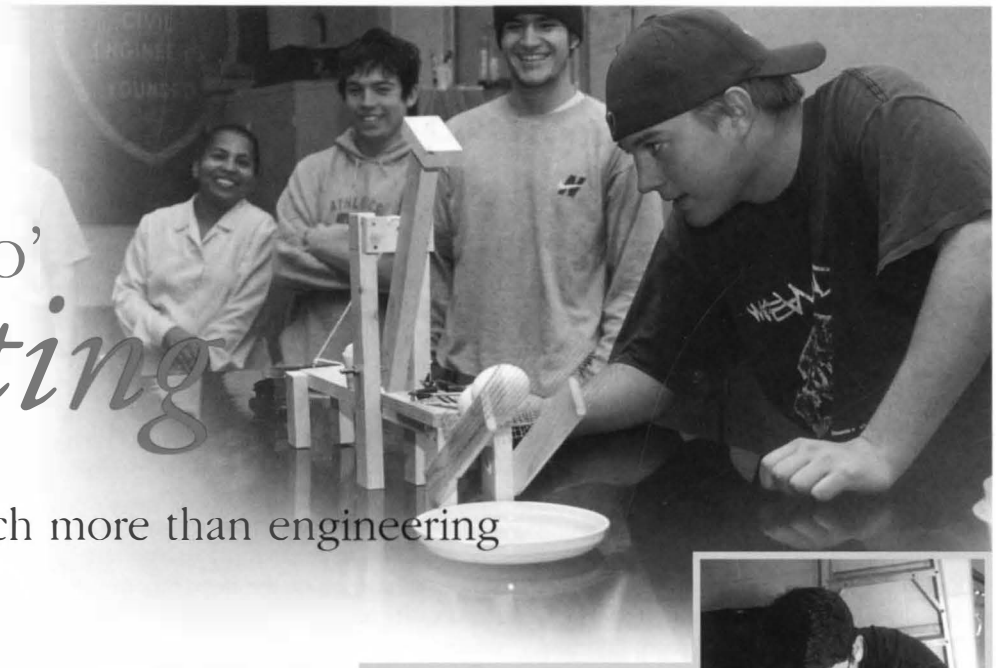
A three-story elevator tower and stairs will be constructed on the north side of Solberg Hall. The addition will allow for access to all levels of the building for handicapped individuals as well as providing exits.

Professor Halvor Christian Solberg, who introduced the mechanical engineering program at SDSU, directed the construction of Solberg Hall in 1901.

The Physics and Engineering Building, as it was then known, was a two-story structure reflecting the Italian Neo-Classical architecture popular between 1890 and 1920. A third floor was added between 1910 and 1920. The one-story annex east of the original building resulted from two more additions between 1920 and 1930. The building was renamed Solberg Hall in 1966.

# Making 'Intro' *interesting*

## Goldberg projects teach more than engineering



The Introduction to Engineering class goes beyond teaching the different areas of engineering, says Professor Mylo Hellickson.

He teaches that "engineering is a people business with a high level of technology," Hellickson said.

With a class of seventy-five students spring semester, Hellickson tries to find fun and creative projects that will teach them more than just basic engineering skills. This is the second semester that Hellickson has been having his students design and build a Rube Goldberg machine.

The Rube Goldberg machines take an everyday task, like stapling paper, and making the task more difficult by requiring at least six steps to do it.

Students build, demonstrate, and create a report with drawings as part of the assignment. They are not only building something that works, but also learning about materials, teamwork, communication, and problem solving, Hellickson says.

"I was more excited to see students working together than if their design worked perfectly." Hellickson said.

He adds that he tries "to get the seed planted that this is an interpersonal business. You'll have to sell your idea to your boss and the rest of the design team."

One objective for the intro class is to teach them how to solve real-life problems. Students receive $10 to build a design, some of which caused balloons to pop, lights to turn on, or eggs to scramble.

"In the real world you are given an objective to achieve and the criteria to meet it and you have to find a solution that works," Hellickson says.

Another goal of the class, Hellickson says, is to teach students that the things they design are not self-fulfilling ideas. They are created for a purpose.

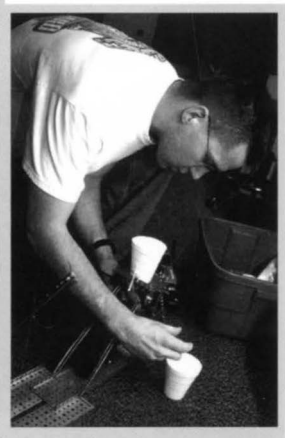
"Engineers need to learn the end product isn't a computer program or a bridge—it is something that helps people," Hellickson says.

Hellickson introduces his students to the College, its departments, and many of the resources available on campus.

For many new engineering students, this class is the first chance to meet others in their major and to get involved in the University.

Without this class, students may not know what area of engineering to choose, or even if they want to stay in engineering, he says.

**Right**: Freshman Michael Jacobson of Brookings rewires a light bulb for their Rube Goldberg machine before demonstrations began April 10.
**Below:** Freshman Scott Christianson of Toronto helps his teammate set the mousetrap for their project. Professor Mylo Hellickson watches from behind.



**Above Left:** Joanne Berg of Pierre, left, and Ross Grupe of Webster balance a cup full of water. Their machine would extinguish a candle by dumping water on it.
**Above Right:** Freshman Justin Larson of Volga makes last minute adjustments to his group's Rube Goldberg machine.

# Exposed to engineering

## Annual event for high schoolers puts emphasis on fun

Organizers of large events know this basic rule: People won't come back if they don't enjoy themselves or recognize a benefit.

Applying this rule to the College's annual Engineering Expo underscores the success of the spring event.

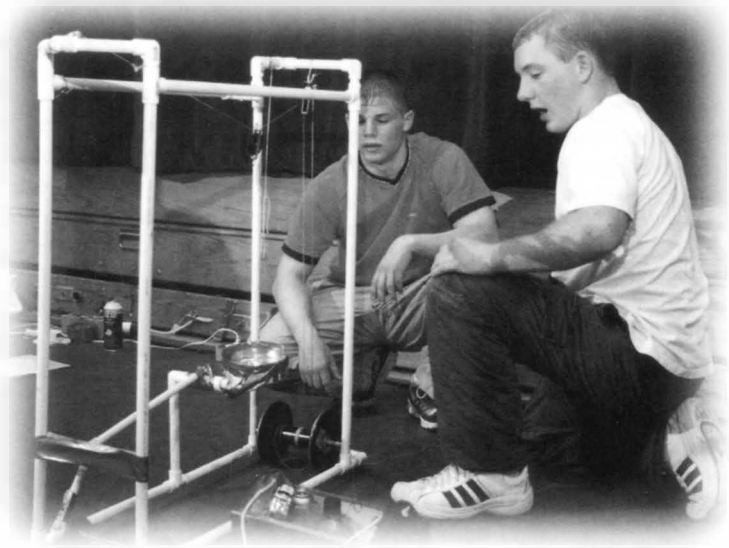
"It just keeps growing and growing and growing," boasts Barb Dyer, who had left her post in the dean's office to work the registration table at Frost Arena on this busy Friday morning in April.

In 2000, there were thirty-three high schools and just over 400 students participating. This year's event drew thirty-seven schools and 454 students.

The increase didn't go unnoticed by Scott Dunn, who co-chaired this year's event with Tricia Berger.

"There is a lot more people here this year. It's slowly increasing in numbers, which is positive to see the people exposed to SDSU and engineering," notes Dunn, who competed at the Expo when he was at O'Gorman High School in Sioux Falls.

"I thought it was a great thing. It got me involved in engineering. It sparked an interest," the sophomore recalls.



But the Expo isn't an event just for students from the region's large schools and advanced science classes.

Wolsey, a high school of seventy-two students sixteen miles northwest of Huron, had eight students registered. The group—a senior, two sophomores, and five juniors—didn't comprise any specific science class.

"They're just students interested in science," says their teacher, John McEnelly.

"The Expo is an opportunity to expose the kids to something a little different. It gives the kids an opportunity to see how those goofy math formulas are put into applications. And it gives the kids a chance to see Dr. [Larry] Browning.

"I've seen his demonstrations eight or nine times, and it's always entertaining, always something new," McEnelly adds.

# *College pays tribute to its best*

Four graduates were bestowed the title of distinguished engineer at the College's annual Distinguished Engineers Banquet March 30.

**Donald J. Edwards**, who retired as dean of the College of Agricultural Sciences and Natural Resources at the University of Nebraska, is director of Special Projects for the Institute of Agriculture and Natural Resources and professor of Biological Systems Engineering at Nebraska.

A native of Tracy, Minnesota, Edwards earned his bachelor's degree (1960) and master's degree (1961) in agricultural engineering from SDSU. He received his doctorate in agricultural engineering from Purdue University in 1966.

**Harold C. Hohbach**, a native of Plankinton, earned a bachelor's degree in electrical engineering (1944) and a bachelor's degree in business administration (1947) from SDSU. He also obtained a degree in patent law in 1952 from the University of California in Berkley.

Hohbach has been a member of the firm Albritton and Herbert since 1952 and is a partner/patent lawyer for the law firm Flehr, Hohbach, Test. He established the Harold C. Hohbach Chair in electrical engineering at SDSU.

**John (Jack) Marshman**, a Sioux Falls native, earned his bachelor's degree in civil engineering (1955) from SDSU, and his master's degree in civil engineering (1956) from Lehigh University in Bethlehem, Pennsylvania.

After a short stint in the Army, Marshman returned to Sioux Falls and joined the Sioux Falls Construction Company. After several years as a construction superintendent and project manager, Marshman was named general manager in 1970. He advanced to the position of president in 1985 and was elected chairman of the board in 1999.

**Charles Onstad** is director of the Southern Plains Area for the U.S. Department of Agriculture-Agricultural Research Service in College Station, Texas. The area covers Arkansas, New Mexico, Oklahoma, Texas, Mexico, and Panama.

A Spring Grove, Minnesota, native, Onstad earned his doctorate in agricultural engineering from SDSU in 1972. He received his bachelor's degree (1964) and master's degree (1966) in agricultural engineering from the University of Minnesota.

# Start your ENGINES

## *Expo puts seniors' brains into high gear*

Richard hits the brakes and he is jerked forward in the seat. Just as quickly, he steps on the gas and his body is thrust back in the seat. His body vibrates as he goes over some bumps. Then it's into a turn and he again feels the forces of speed and gravity at work.

Richard is an adventurer and racing gives him an adrenaline rush. The androgenic hormones were in abundance this Friday. It was his big day. The chance to show off his work. When he was behind the wheel, he felt like a NASCAR racer going 200 mph.

But fortunately for those of us who were out on the Brookings streets Friday, April 27, Richard Schuerman wasn't actually going anywhere.

Richard Schuerman takes his turn at the wheel of the Heat Seat under the watchful eye of other senior design team members, from left, Brent Mannes, Bob Young, and Terry Rennich. Their project allows the driver of a computer-simulated racecar to experience a physical response in conjunction with on-screen action.

He was safely behind the wheel of the senior design project he built with fellow mechanical engineering majors Brent Mannes, Terry Rennich and Bob Young.

Their project, the Heat Seat, enables the driver of a computer-simulated race car to experience a physical response in conjunction with on-screen action. Judging from spectator interest, it was the hit of the annual Engineering Expo at Frost Arena.

In addition to being popular with the crowd, the team won the first-place prize of $500 at the Engineering Expo for the best engineering design. "We're currently researching protecting our idea with patents and putting together a business plan," Schuerman shares returning from a successful job search with Caterpillar, Inc.

"Other people have weld fixtures or industrial things. We've got a great toy," Schuerman says in comparison with the other senior design projects.

### • Making dreams happen

The May graduate from Sioux Falls races on the Internet. "Last summer I was leaning in my chair [during an online race]. Boy, I thought that would be neat if the chair moved."

Leave it to an engineer to turn a wish into reality.

Since last fall Schuerman and company have been working to reach their goal of creating a force-feedback simulation seat. A force-feedback device creates motion to allow the controller of a computer-simulated environment to experience an actual physical response.

In other words, when the racer guns the "engine," he feels his body being thrust back in the seat.

### • Try this at home

The students created "Heat Seat" with the home recreational user in mind. Electric motors and linear positioners were donated to the project. Otherwise the cost would have been $4,000. But the group estimated it could make a profit on "Heat Seat" if 100 of them were sold at $3,500 each.

It runs off household current and Schuerman says it can be easily modified to other computer applications, such as watercraft or aircraft flight simulations.

He said the group saved a lot of headaches by using a software design package called Pro-Engineer. "We did a lot of design changes in cyberspace before we ever put it together." As a result, when it was time to assemble the metal frame unit with computer monitor, keyboard, exterior speakers, "it fit. There was no 'Oh no, I never thought of that,'" Schuerman shares.

According to the students, Heat Seat "has catapulted racers to the next level of experiencing NASCAR racing at home."

## • Designing a better hovercraft

Schuerman and his partners were among several engineering students who wanted to take a project to the next level.

Perhaps most notable were Robert Lacher, Jason Osbahr, Jon Schultz, Brent Peterson, and Erik Hanson, who took up the hovercraft project that made headlines at the 2000 Expo.

The project undertaken last year by Jonathan Hagena, Les Fleming, Karl Palmberg, Todd Vanderlinde, and Jason Haufschild was the first hovercraft built by SDSU mechanical engineering students since the 1960s. The unique effort earned the quintet footage on Sioux Falls television and headlines in the newspapers.

But it wasn't a perfect machine. That's where this year's senior design students came in.

## • Getting favorable results

They were looking for improvement in four areas—safety, durability, thrust, and controls. Objectives were met in all four areas, according to Jon Schultz, of Nicollet, Minnesota.

"The whole rear end was redone. We added a shroud and beefed up the steering linkage. It's stronger, more responsive," explains Osbahr, of Dakota Dunes. The yellow and blue, flat-bottomed craft went from using a propeller to using a fifty-two-inch pitched fan.

"That provides more thrust and moves more air, which is directed and concentrated through the shroud," the mechanical engineering major explains.

A hovercraft resembles a fan boat commonly used in the Florida Everglades, but because the hovercraft travels on a cushion of air trapped in a chamber beneath the craft, it can operate on bare ground, water, ice, snow, or the SDSU practice fields. That was site for the group's test runs the week before the Expo.

"There were no durability problems. Everything we built worked. Nothing broke," Schultz in an eleven-word summary of a two-semester project.

Osbahr says the biggest challenge with the hovercraft is driving it. Lacher, of Lebanon, quips, "It's kind of like a car on ice, but better because you can steer it."

With four of this year's five members graduating, it will be up to the 2002 graduates to see if the hovercraft becomes an annual project for the senior design class.

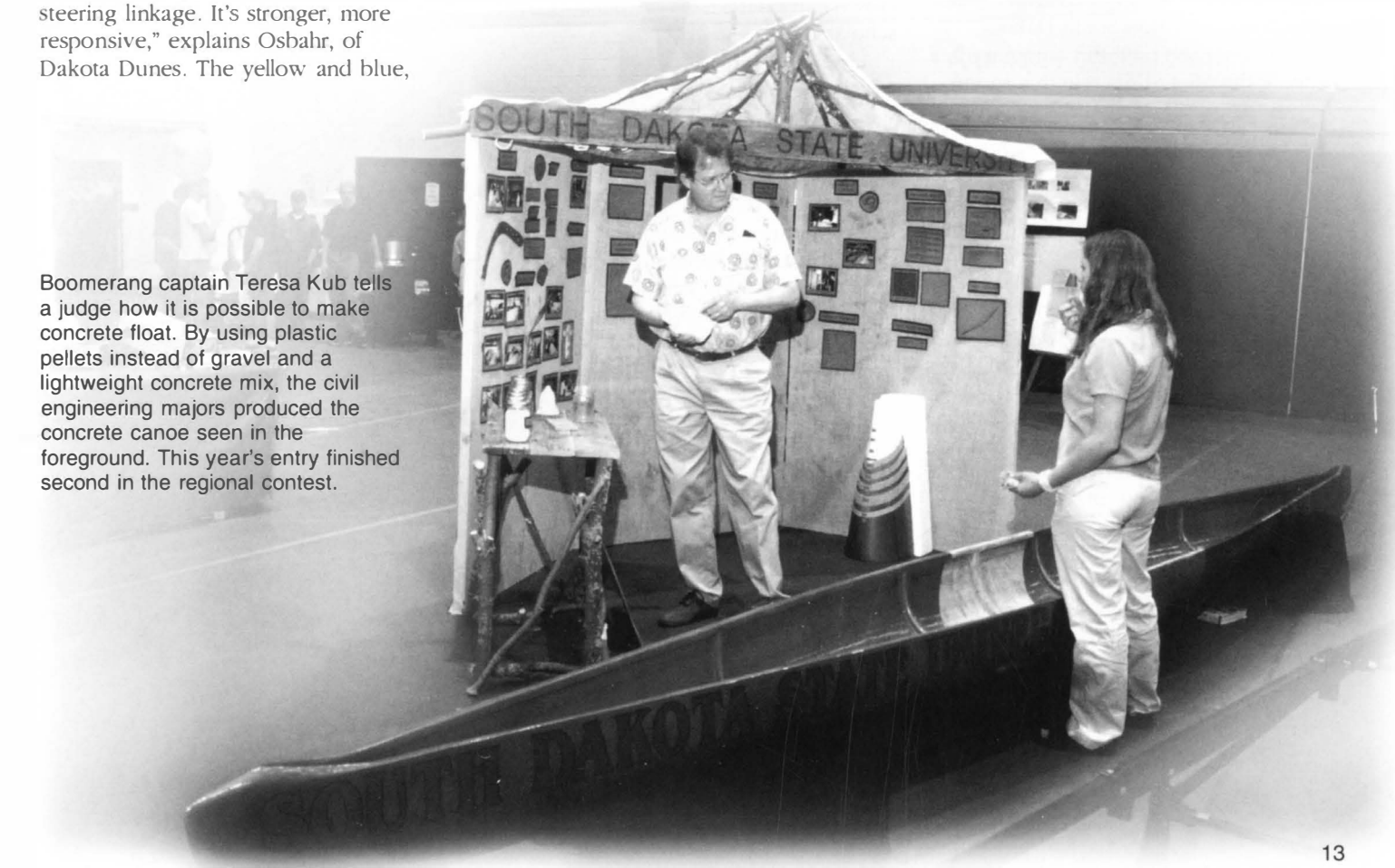
## • Meeting a traditional challenge

While the hovercraft may be on the road to becoming as symbolic of mechanical engineers as the Baja buggy, the concrete canoe has become a fixture of civil engineering majors.

The narrow, bronze-colored water skimmer shared Frost Arena floor space with the various senior design projects. Past paddlers have left big lifevests for future engineers to fit into. SDSU won regional titles in 1998 and '99, qualifying for the national event.

For this year's crew, competition ended in some chilly Iowa waters in early April with a second-place finish. But captains Josh Storm (Mitchell), Paul French (Seattle), and Teresa Kub (Ipswich) and their crew created a lot of memories with Boomerang, the name they dubbed their craft.

While the civil engineers version of an Australian canoe was 21 1/2 feet long and weighed 100 pounds, it was no chunk of lead. Traditional concrete weighs 150 pounds per cubic foot. Water weighs sixty-two pounds per cubic feet. Boomerang virtually floated on the scales—just 39 pounds per cubic foot.




Boomerang captain Teresa Kub tells a judge how it is possible to make concrete float. By using plastic pellets instead of gravel and a lightweight concrete mix, the civil engineering majors produced the concrete canoe seen in the foreground. This year's entry finished second in the regional contest.

# *Miss* ME Mechanical engineer

In the spring of her senior year at Custer High School, Andrea Twedt entered her first pageant as a way to rebel against her feminist mother.

"She's a supporter of the feminist movement and pageants have the reputation that you walk around—parade yourself—and ask to be judged," says Twedt, 19, a sophomore mechanical engineering major at SDSU.

But Janet Twedt is an even bigger supporter of her daughter, and when it came time for Andrea to compete in the 1999 Miss Black Hills Gold pageant, she signed Andrea's permission slip and was in the audience rooting for her National Honor Society student.

Twedt won the pageant and qualified for that summer's Miss South Dakota pageant in Hot Springs.

Janet Twedt's opinion of pageants slowly changed, says her daughter, who competed in the Miss South Dakota pageant a second time this summer after winning the Miss SDSU title this spring.

Andrea says her mother's new way of thinking wasn't so much a result of the tiara her daughter brought home or what they witnessed during the pageant, but the change she noticed in her daughter.

"It was more what we got from the pageant afterwards," Andrea says. Janet saw how the pageants helped her daughter enhance her skills, particularly interviewing skills.

There were other benefits she gained as well, including being able to present herself well in front of a group, the ability to communicate, gaining poise, and working with other people in a competitive environment, Andrea says.

"I've never been much of a communicator," she says. But pageant involvement forced her to be able to think on the spot, develop and share ideas, and be comfortable speaking to someone she has never met.

## • 'A great program'

Twedt's walk along the pageant runway wasn't strictly an act of defiance. In high school she had been involved in cheerleading, theatre, music, and swing choir. Some of her choir friends were entertainers at the pageant, and one of her friends was first runner-up in the Miss Black Hills Gold contest in 1998.

During her freshman year at SDSU Twedt did not enter any contests. But she did do a lot of thinking about the Miss America-style pageants.

"When you sit back and evaluate the program, it's really a great program; plus the scholarship money is really helpful," Twedt says, noting that the Miss SDSU title earned her a $1,000 scholarship and the Miss Black Hills Gold crown carried a $1,250 scholarship.

## • Not like the movies

Twedt also has been impressed with other contestants.

Contrary to some Hollywood portrayals, girls aren't backstage ripping dresses and pulling hair. Most contestants are quite friendly and talented, Twedt says.

She was particularly impressed with Sara Frankenstein of Redfield, who wore the Miss South Dakota crown in 1998. "When I was competing at the state level [in 1999] she was giving away her title," Twedt says.

# competes for Miss South Dakota title

Frankenstein kept in contact with Twedt and "her family is just very supportive of the program. They helped me see that it is more than just walking around on the stage."

During the competition, contestants are judged on an interview, thirty percent of the total score; talent, forty percent; eveningwear, fifteen percent; and swimwear, fifteen percent.

## • Building support for Habitat

She notes the pageant also gives her a chance to promote one of her passions—Habitat for Humanity. Twedt serves on the board of directors for the Brookings Area Habitat for Humanity.

Twedt has been on the Habitat board since the fall of 2000. Patty Bacon, executive director of local Habitat organization, said Twedt "brings a freshness and youth to the board."

She is heavily involved with committees and was instrumental in creating a campus Habitat for Humanity organization, Bacon says.

A majority of her time spent preparing for competition is working on and learning about Habitat for Humanity.

She estimates that she spends four to ten hours per week working with Habitat for Humanity. As a director, she is involved in choosing a family and preparing budgets for each project.

"The more I learn, the more I want to help the cause," Twedt says.

Originally, her platform was building character, but growing up next to a Habitat for Humanity house and her involvement with the local chapter prompted her to change her platform.

## • Music education? Mechanical engineering?

In the talent portion of the June 18-19 contest, Twedt sang "June is Busting Out All Over" from the musical *Carousel.* "I knew it was what I wanted when I heard it," she says.

But wait a minute. What's a story like this doing in an engineering magazine?

Well, Twedt has a love for music and for problem solving, which led her to choose SDSU over other schools in the state. Because SDSU offers strong engineering, music, and theatre departments, she could wait to settle on a major until after arriving in Brookings.

Twedt choose mechanical engineering and has become a member of Phi Tau Sigma, the mechanical engineering honorary society; and the American Society for Mechanical Engineers. She also is president of the Society for Women Engineers, helps organize the Engineering Expo, is involved in Pierson Hall government, and is enrolled in Honors College.

## • A unique background

Not many women outside of music and theatre enter the contest, says longtime pageant producer Ray Peterson of SDSU's theatre program.

"I hope I'm showing [that] anyone can be involved," Twedt says.

It shouldn't matter if a woman is an engineering student or a theatre major, Peterson says. Judges seek a talented all-American girl, he adds.

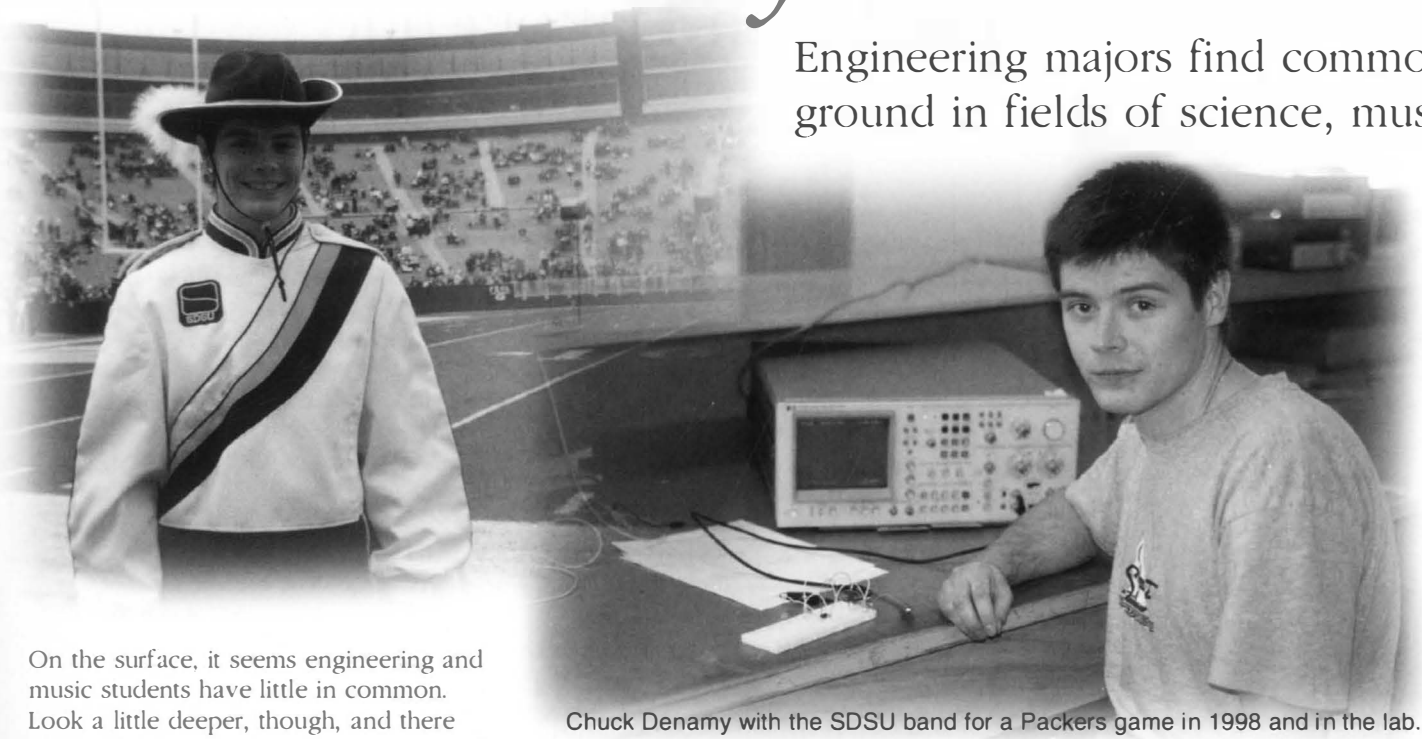
Twedt agreed, "There are so many aspects of women. It [the competition] gives me a chance to think about something other than my dynamics homework that is due in two days," Twedt said.

Skills gleaned from pageants and an engineering background are not only applicable to school but life, too.

"Every learning experience leads to the next."

# Noteworthy Students

## Engineering majors find common ground in fields of science, music



Chuck Denamy with the SDSU band for a Packers game in 1998 and in the lab.

On the surface, it seems engineering and music students have little in common. Look a little deeper, though, and there are similarities necessary to be successful in both branches of education.

Although playing the flute and building a bridge are vastly different enterprises, Brett Friedman, a junior from Sioux Falls, sees two angles to the equation.

"They are two pretty different fields," asserts Friedman, a mechanical engineering major in marching band. "Music is more art oriented. Engineering is more common sense and practical.

"What ties them together is the math aspect of it. You use math all the time, always counting, making sure of the beat. I've been told that kids do better in math when they are in music."

Friedman, a 1999 graduate of Sioux Falls Washington High School, hopes for a career dealing with engines. "I've always been interested in the aerospace industry like Lockheed Martin or NASA, but it might be working for a car company, designing and building engines."

Tuba player James Walsh, a sophomore mechanical engineering major from Vail, Iowa, is a 1999 graduate of Carroll Kuemper High School. He agrees with Friedman's math assessment, adding, "You're always calculating. You have to pay attention and think what you're doing. You can't afford to mess up."

Tracy Holmoe, a senior from Sioux Falls, thought for a moment before realizing the role physics plays in her musical skills as part of her electrical engineering requirements.

"We learn about resonance in physics where two pitches of sound are close together, yet they aren't in tune with each other," she says. "Their wave lengths are slightly different. We also learn about resonance when we tune our instruments."

Holmoe, a marching band participant, spends her summers working with the drum line at Sioux Falls Lincoln High School, where she graduated from in 1997.

Holmoe, who was named station manager at the campus radio station KSDJ after serving as music director last year, would like to study fuel-efficiency techniques. "I would like to look at ways to conserve energy and develop alternate ways to power things."

Chuck Devaney's main concern is balancing the two entities. "My main conflict is with practicing," he says. "Engineering is demanding in itself and being in music takes a lot of your time practicing five days a week."

**Engineering majors participating in music during 2000-2001 school year:**

Isaac Anderson, Sioux Falls (marching band); Brian Bigge, Huron (marching band); Jordan Buri, Burnsville, Minnesota (concert choir); Chuck DeVaney, Sioux Falls (marching band);

Doug DeVaney, Sioux Falls (marching band, university band); Brett Friedman, Sioux Falls (marching band); Tyrone Gross, Volga (concert choir); Jaime Haiar, Madison (marching band);

Brad Hakeman, Wentworth (marching band); Tracy Holmoe, Sioux Falls (marching band); Jonathan Kennedy, Blue Earth, Minnesota (concert choir, civic symphony); Todd Livingston, Salem (marching band); Mike McCarty, Spencer, Iowa (marching band);

Megan McMahan, Kenyon, Minnesota (marching band); James Petersen, Burke (university band); Sara Schneider, Pierre (marching band); Troy Small, Blaine, Minnesota (marching band);

Matt Stubbe, George, Iowa (marching band); Mike Uken, Brandon (symphonic band); Brian Vrchota, Jackson, Minnesota (symphonic band); Jared Wallace, Garden City, Minnesota (marching band);

James Walsh, Vail, Iowa (marching band); Jordan Williams, Dell Rapids (marching band); Desiree Wilson, Lakewood, Colorado (marching band); James Ziebarth, Madison (symphonic band).

# Reaching out

## to high school students with Visitors Team

Anna Netterville

"I've always been interested in advocating our education system. I feel it's an important thing to do."

That's how Anna Netterville approached her role as coordinator of the High School Visitors Team for the 2000-2001 school year.

Netterville, along with seniors Jermiah Langdon and Rachel Quam, have been closely associated with the High School Visitors Team. Members represent the College by providing information on engineering careers and promoting the majors within the College through presentations to high school students and the public.

The students work individually and as a group. Their goal is to make about twenty visits during the year to schools in a two-hour radius.

"The High School Visitors Team is an excellent way for students at SDSU to reach out to high school students and tell them about science, engineering, and technology," says Virgil Ellerbruch, who launched the program in 1995, and retired as dean of the College June 30. "Team members gain experience in communicating technical concepts and ideas to high school students."

To be considered for membership, students must carry a 2.5 cumulative grade point average or better. In addition, they must complete at least 12 hours of training, agree to be on the team a minimum of one academic year, and be able to speak effectively.

The High School Visitors Team offers the best of both worlds. Not only are high school students exposed to what life would be like as an engineer, team members are educated themselves in many different facets of personal growth and achievement.

Members are given the chance to improve their organizational and public relations skills; gain experience with interviews; make potential contact for future career opportunities; and receive recognition among peers and professionals through the College.

Netterville, a native of Charlieville, Louisiana, earned her bachelor's degree and master's from Northeast Louisiana. While leading the Visitors Team, Netterville is pursuing a doctorate in sociology. She also serves as the Education Outreach Coordinator and oversees the Aerospace Career and Education (ACE) Camp that's held during the summer.

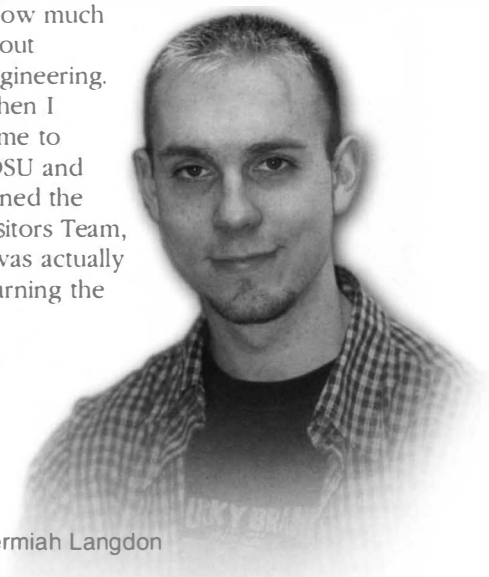
Netterville's involvement in the leadership positions comes from her secondary area of interest in geography, specifically, geographic information systems. She worked at the Social Science Research Center as a graduate assistant while attending Mississippi State University.

Rachel Quam

"I worked as an assistant on the Department of Transportation's seatbelt, child restraint, and motorcycle helmet surveys," says Netterville. "I've always had a strong interest in science."

Quam, a native of Huron, will graduate in December with a degree in electrical engineering. She was a member of the team for three years, including a stint as coordinator in the fall of 1999. Quam says working with students has proven to be a valuable experience.

"I got involved because my older sister was a member," relates Quam, who spent the 2000 spring semester studying in Manchester, England. "In high school, I didn't know much about engineering. When I came to SDSU and joined the Visitors Team, I was actually learning the same time the high school students were," Quam says.



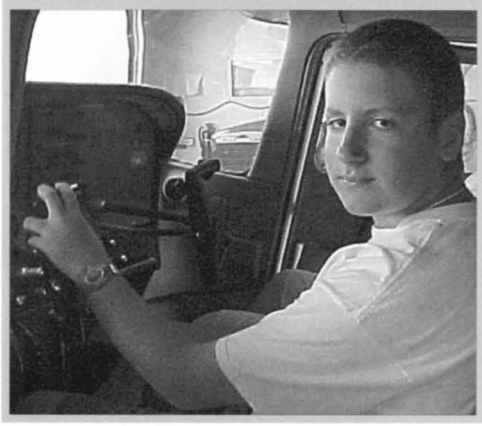
Jermiah Langdon

Langdon, who attended Sioux Falls Roosevelt High School, will graduate in May 2003 with a triple major in physics, mechanical engineering, and mathematics. Between his studies, he works part-time at Daktronics. Despite his busy schedule, he's extensively involved with the Visitors Team.

"I like to teach," says Langdon, who took a semester off when he enlisted in the Army Reserves. "I've been really enthusiastic about science since high school. I had an excellent physics teacher in Arlyn Thomas. He had all kinds of good experiments he would show us and we really got into it. Physics is a small major here so I try and promote it as much as possible."

# ACE Camp a winner

*Survey shows participants use camp as career launching pad*



A tour of the South Dakota Air National Guard base in Sioux Falls is among the activities organized for ACE Camp participants.

Corey Brown appreciates what the Aerospace Career and Education (ACE) Camp did for his career when he attended the first camp in 1992.

"ACE Camp was vital in providing me an introduction into the aviation field," says Brown, a U.S. Naval Aviator, who graduated from the University of Notre Dame. "I probably would not be flying today if it hadn't been for ACE Camp."

Celebrating its tenth birthday this year, ACE Camp has attracted 208 high school students for five days filled with learning aviation related activities. Traditionally held the second or third week of July, ACE Camp is designed to create an aviation-aware society that better understands and respects the importance of aviation at the federal, state, and local level.

"Students become more knowledgeable of why aviation is important to the world," says Anna Netterville, coordinator of ACE Camp. "It gives students worthwhile experiences and enables them to make better informed decisions when they consider college and career options."

Brown, a native of Gettysburg, was responding to an ACE Camp survey that covered an eight-year period from 1992 to 1999. With assistance from the SDSU Foundation, the study offers a glimpse of how the camp has impacted the lives of the students.

According to the survey, fifty-three students are in college or have graduated, and eighty-nine are still in high school. Seven students have attended ACE Camp twice and one has enrolled three times. Five ex-campers graduated from SDSU in 1999 and sixteen are currently enrolled at State.

According to Kevin Dalsted, director of the Engineering Resource Center, the survey is a good indication of what ACE Camp is all about.

"It speaks well of the students who have attended," says Dalsted, who also serves as associate director of the South Dakota Space Grant Consortium which sponsors ACE Camp. "It says students have seriously considered aviation and aeronautics as a career, and a good number of them are continuing to find it's the way to go."

Chad Fickbohm of Alcester was an ACE Camper in 1993 and now works for Rockwell-Collins designing avionics packages.

Brent Chapman, a 1997 camper from Hills, Minnesota, is majoring in aviation at Minnesota State-Mankato. "ACE Camp showed me some of the different jobs in aviation so I decided to major in that," he says.

ACE Camp students are treated to a vast array of activities. In Sioux Falls, there's a tour of the South Dakota Air National Guard, a hot-air balloon ride, and in-flight training by Business Aviation. Other tours include the EROS Data Center near Baltic, and the Aviation Maintenance Department at Lake Area Technical Institute in Watertown. The image processing lab at SDSU offers hands-on experiments while Oakwood State Park serves as the site for star gazing.

### Space Day

Space Day, an off-shoot of ACE Camp, is tentatively scheduled for April 5, 2002 at Frost Arena. Dalsted says he hopes to hold it in conjunction with the Regional Science Fair for middle school and high school students.


Tanna Maupin checks the fit of a space suit during a visit to the Washington Pavilion in Sioux Falls.

# TOPS in the ZONE

## Civil engineering club again honored for outreach, organization

For the SDSU chapter of the American Society of Civil Engineers, the "CE" might also stand for community example.

The students spent a total of 1,760 hours on community service in 2000—from speaking with a Boy Scout troop about engineering to helping on a Habitat for Humanity project. All that effort hasn't gone unnoticed, either by those who were helped or by the national office of the ASCE.

Late this spring the SDSU chapter was notified that it was the top club in Zone III, a fourteen-state region stretching from Texas to North Dakota, and from Illinois to Colorado.

"The main items that put us over the top are our community service activities. Community Service Coordinator Erin Richter had us doing activities I didn't even know about; they were so busy. Erin did a bang-up job," brags advisor Charles A. "Chuck" Tiltrum.

He notes this is the second straight year the group has won the zone award, and two years ago the club won national chapter of the year honors.

The club boasts ninety-six members—about half of the department. Among the eighty-eight juniors and seniors with civil engineering majors, sixty-nine percent belong to the club.

The chapter also scores a lot of points with its field trips and for the guests who speak at club meetings. But special projects account for a third of the points in the chapter contest, and SDSU's report on special projects goes on for twenty-eight pages.

Most notable was the chapter's participation in Building Big, an outreach program designed to coincide with a five-part "Building Big" series aired in October 2000 by PBS. The chapter participated in the kickoff at Pierre and then presented hands-on activities at eight middle schools in the state.

Richter says that the club's community service projects concentrated mostly on area youth and introducing them "to the wonderful world of civil engineering." she notes.

Leading the club during calendar year 2000 were Teresa Kub, of Ipswich, president; Crystal Dulas, Wells, Minnesota, vice president; Jason Boomer, Martin, recording secretary; Jason Lockhart, Spearfish, corresponding secretary; Tricia Berger, Custer, treasurer; Kari Svennes, Beresford, recruitment chair; and Erin Richter, Kilkenny, Minnesota, community service coordinator.

New officers, who were seated in January, are: Laura Baumberger, Colton, president; Kari Svennes, vice president; Josh Sebern, Beresford, secretary; Justin Kannas, Watertown, treasurer; Eric Landis, Mobridge, corresponding secretary; Mary Storsteen, Pierre, recruiting secretary; Joey Chilson, Sisseton, freshman contact; and Christen Beall, Huron, sophomore contact.

# *Outstanding* physics students

Once again, the Society of Physics Students at South Dakota State University has been nationally recognized as an Outstanding Chapter by the American Institute of Physics.

Advisor and department chair Oren Quist credits the designation to the numerous activities performed by the ten-member group.

Examples include making presentations at high schools with other students from the College of Engineering, making nine professional presentations to local faculty, conducting "star parties," to allow area elementary students to view the night sky, and helping with the annual high school Physics Bowl at SDSU

Directing the SDSU chapter in 1999-2000 were: Corey Halstad, Vermillion, president; Shelbi Hostler, Ames, Iowa, vice president; Kurt Amundson, Rochester, Minnesota, secretary; Joanna Even, Brookings, treasurer.


Members of the Society of Physics Students gather at a spring semester meeting. Pictured are, kneeling, front row, from left: Jermiah Langdon. Second row, Bernice Larson-Stuefen, Beth Rybak, Wade Kempf, and Joseph Sterling Nelson. Back row, Greg Nolz, Gary Carlson, Adam Sorenson, Brandy Carlson, Jordan Williams, Barney Nemec, and Vince Scholten.

Other members were: Michelle Knuppe, Dell Rapids; Mark Prange, Brookings; Leslie Flemming, Florence; Bernice Larson-Stuefen, Elkton; Terdousi Siddique, Brookings; Jason Heinemann, Flandreau; Joshua Olson, Sioux Falls; Gynaesh Chander, Brookings; Ryan Knox, Brookings.

# Golden Tribute

## to the silver-haired dean

### *May 3 officially designated as Virgil G. Ellerbruch Day*

For being a quiet man, Virgil Ellerbruch can sure draw a crowd.

More than 200 people stopped by the Walder Room in the University Student Union May 3 to bid adieu to a gentleman some knew as dean, some as professor and colleague, some as grandpa, and many as friend.

Ellerbruch, 65, officially retired as dean on June 30 after thirty-four years of service to SDSU. Holding his farewell while school was in session gave a chance for more people to extend their wishes to a guy as classy as the three-course munchie buffet that enticed his afternoon guests.

With Ellerbruch personally greeting each visitor upon arrival, the program started a little later than planned.

That was OK because the electrical engineer was short on words. As he began to address the gathering at the end of the program, Ellerbruch closed his eyes and swallowed down a large gulp of emotion before he spoke. Recomposed, the dean said, "I was going to say 'If I start to thank people I might get emotional.'"

Plenty of other people provided words for Ellerbruch, who had the day officially designated in his honor by S.D. Governor William Janklow.

#### • 'Very well liked'

Carol J. Peterson, provost and vice president for academic affairs, remarked, "When I shook Virgil's hand, I told him he must have been here a long time or be very well liked. I think maybe it's both. It's very impressive. It does show you, if you stay long enough, you get quite a party."

Ellerbruch's party included colleagues from within the College, the past and future deans, administrators, Jerald Tunheim (president of Dakota State University and a former colleague of Ellerbruch), and Ellerbruch's nine grandchildren.

A couple of the younger ones ran out to see grandpa during the program. But he wasn't flustered. Perhaps it is that demeanor that prompted Peterson to earlier say, "I couldn't have had a better, more experienced, more equilibrium-building dean to work with."

Ellerbruch's steady nature was appreciated as much as his accomplishments, which were numerable.

#### • 'Paid rent in full'

President Peggy Gordon Elliott reminded the gathering, "When we were all undergraduates, they drilled in us the importance of service. They said service is the rent you pay for the privilege of living on this planet. Virgil, you've paid your rent in full."

In addition to serving his industry and College in various areas, Ellerbruch also served on the Brookings Municipal Utilities board for fifteen years with five-year appointments by three different mayors. He is a member of the Brookings Federal Bank board of directors and participates in Ascension Lutheran Church.

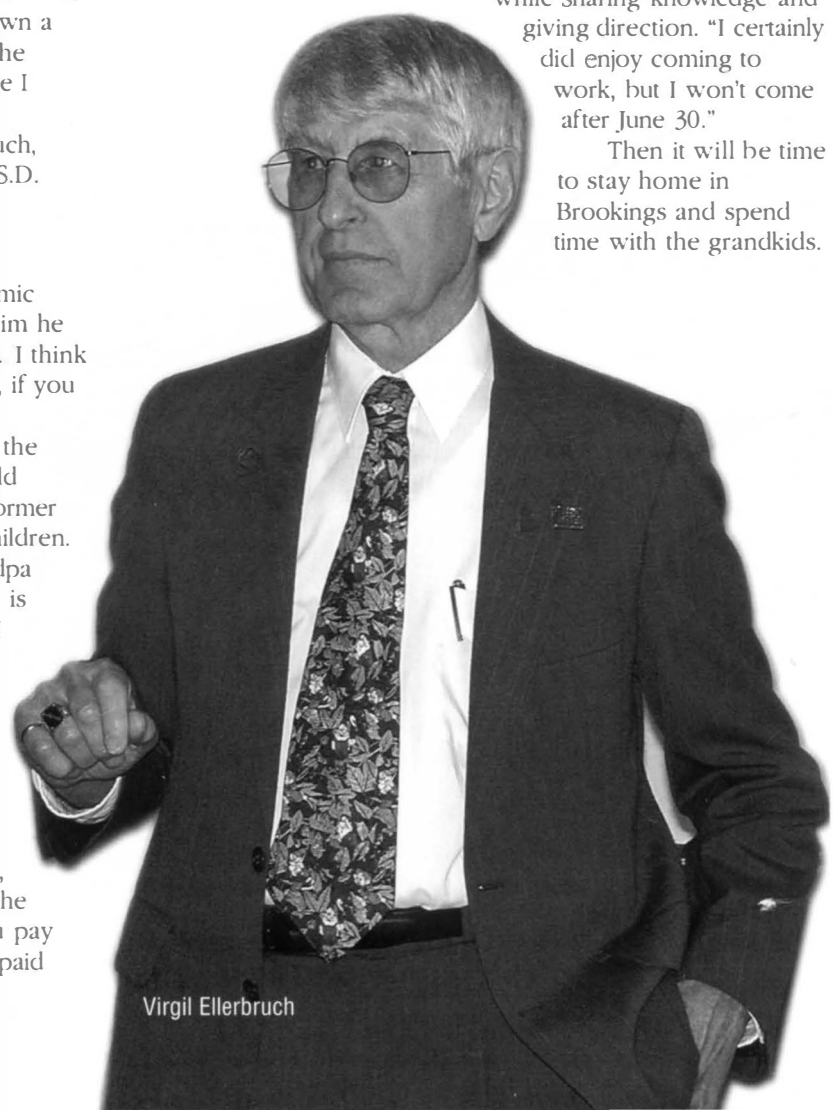
As the speaker at winter graduation, Ellerbruch called upon graduates to share with their community and volunteer time and expertise.

Among those who lauded the dean was Aelred Kurtenbach, chief executive officer of Daktronics in Brookings. He cited Ellerbruch's influence on his children, four of whom became electrical engineers and a daughter who married an electrical engineer. The two taught in the College together from 1968 to 1973 and served as deans for the past two years.

"We've been a good team. It's been fun for me," the industrialist said of the unique partnership.

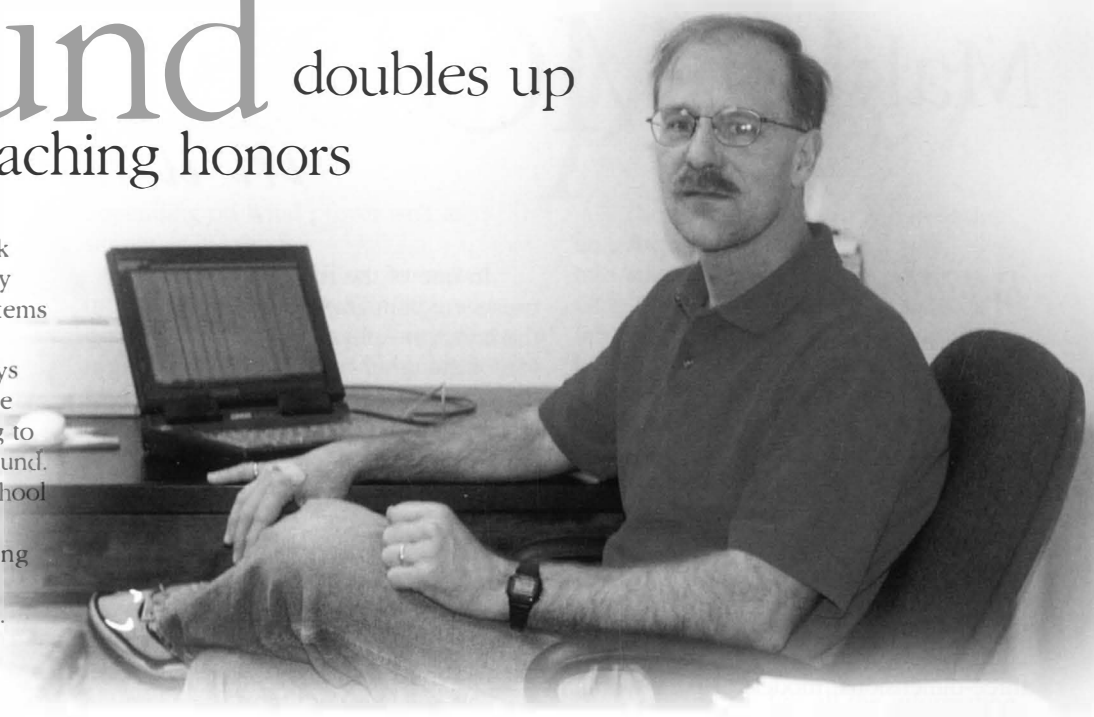
For thirty-four years Ellerbruch has been building relationships with students, faculty, staff, and administrators while sharing knowledge and giving direction. "I certainly did enjoy coming to work, but I won't come after June 30."

Then it will be time to stay home in Brookings and spend time with the grandkids.



Virgil Ellerbruch

# Remund doubles up with teaching honors



Chuck Remund's parents had a sneak preview of things to come when they watched their young son play with items normally reserved for adults.

"When I was two, I would always drag electric appliances around in the house so my folks knew I was going to do something like this," reflects Remund. "Later on in high school, my high school math teacher was a big influence by telling me I should go into engineering and said I was smart enough."

As it turned out, they were right. This year, the Wilmot native was selected Teacher of the Year by the SDSU Students' Association and Researcher of the Year in the College, marking the first time an engineering professor has received both awards at the same time.

"I was surprised," says Remund. "You don't get a lot of positive feedback from students during the semester. "

Remund is a professor of mechanical engineering and serves as coordinator of the Northern Geothermal Support Center. He earned his bachelor's degree (1982) and master's degree (1983) in ag engineering from SDSU. Five years later, he gained a doctorate in engineering from the University of Nebraska.

Remund's research efforts have been extraordinary. During the last ten years he has generated more than $2 million in grants to the College. About $1.2 million was for geothermal heat pump research and close to $800,000 was for training and outreach activities.

"I enjoy the outreach part of my job," adds Remund. "It's not unusual for me to get up at four in the morning and drive to Minneapolis to meet with an engineering team to help them out and come home that night."

Ever since tinkering with his mother's kitchen machines, Remund was destined for a career in engineering.

"As a kid, I was always building and breaking things," he says. "Like most of the students here in engineering, I just had that question in my head of how things worked and why."

Despite the success he has enjoyed in and out of the classroom, Remund says the teaching arm of engineering wasn't his first choice.

"I wanted to be an engineer," observes Remund. "At the time I finished my graduate degree work, there were no interviews on campus in ag engineering. It was the height of the ag recession so it was a pure accident that I ended up teaching."

# 'Detail guy' honored for work

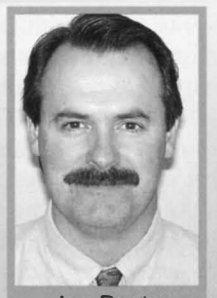
If the safety guard is missing from a piece of equipment or the walkway to an exit is cluttered, Jon Puetz will spot it.

He's trained to and he's been doing it for years. In April, Puetz, a safety and health consultant in the Engineering Extension OSHA consultation office, was honored not only for his years of service, but the level of his work. Since he began his job on March 1, 1990, Puetz has identified 14,398 hazards at 464 work sites in South Dakota.

"That's a phenomenal number," says James Manning, Engineering Extension's program director and Puetz's supervisor.

Puetz is at the work site at the invitation of the employer. "We go in only upon the request of employers who want our service. We don't levy fines," Manning says.

The on-site consultations can include a complete review of all on-site safety and health policies, a walk-through of facilities, indoor air quality testing, and noise surveys. Through a grant with the federal Occupational Safety and Hazard Administration, the SDSU consultation office makes about fifty visits per year.



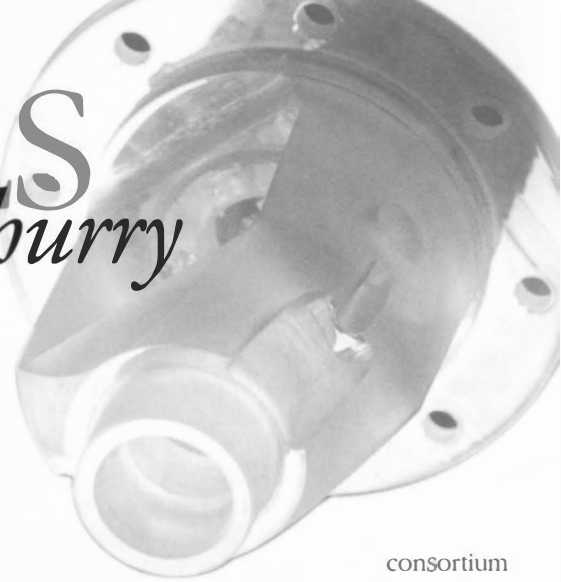
Jon Puetz

Puetz's recognition came at the OSHA Region VIII all-employee conference April 16-20 in Breckenridge, Colorado.

Manning calls Puetz "an excellent and detailed consultant. He's very service oriented; he's always helping clients and co-workers."

Puetz says the recognition is a "true compliment. I've worked quite a few 65-70 hour weeks for a lot of years, and I hope that my hard work has benefited the state's employers, the College, and Engineering Extension."

# Making MODELS *in a hurry*



## *Rapid prototyping consortium links SDSU with industry*

Watching a creation grow before your very eyes is only a small piece to a much larger picture for rapid prototyping machines that greatly benefit SDSU and the state's industry.

The machines take advantage of 3-D computer modeling and actually create three-dimensional models of parts within an hour to a couple of days, depending on the size and complexity of parts, compared to several weeks using traditional methods.

Purchase of the rapid prototyping machines is being made possible through a $600,000 grant from the National Science Foundation that was landed by Carrie Mattson, an instructor and program coordinator in the Department of Engineering Technology and Management, and with an industry contribution of $110,000.

The machines will be located at the Brookings Economic Development Corporation. They will find a permanent home once the renovation of Solberg Hall is completed. Efforts are currently underway to purchase the rapid prototyping equipment as well as required support equipment.

Rapid prototyping is a process where a 3-D model of a finished product is produced by building up layers of material. After being modeled in a computer, the part is divided into thin horizontal cross-sectional layers by prototyping software.

In one of the machines, which uses stereolithography technology, the layers are physically built one on top of the other by directing laser light at the surface of a photosensitive resin. A second machine, which is known as a 3-D printer, uses a plaster fortified with a resin to build three-dimensional models.

"The advantage of having this type of project is we are working very closely with industry and that's something a lot of university programs fail to do," says Mattson. "Here, we feel that's very important."

"Carrie did a tremendous job in taking the lead and preparing the application for the grant so we could get this equipment," cites department head Reza Maleki. "We believe we need to be more involved in applied research. The kind of research that has an immediate impact can help companies in the area."

### Industry partnerships

South Dakota and the surrounding region have a rapidly growing manufacturing sector with the ability to produce a wide variety of products. According to Mattson, many of the industries are small and they tend to rely on services from other organizations.

"Unfortunately, rapid prototyping technology requires a significant investment and therefore is usually purchased as a service by small and medium sized manufacturers," Mattson points out. "South Dakota companies must purchase this service from vendors that are located well away from the design site. This isolates the designer from the rapid prototyping process and that can impair design flexibility."

As a result, the Great Plains Rapid Prototyping Consortium was organized to promote growth and increase competitiveness of industries in the state and surrounding regions.

To support the consortium, members join for annual fees ranging from $5,000 to $10,000. Comprised of manufacturers, educational institutions, and government agencies, the consortium provides access to the technology and availability of rapid prototyping equipment for the design of products at a reasonable price.

The consortium started in May 1998 for initial members Sencore of Sioux Falls, and Falcon Plastics, MTR and Daktronics, all of Brookings. "There has been a great deal of interest in participation," says Mattson. "We are constantly recruiting members."

In addition to the National Science Foundation grant, Excel Energy (formerly Northern State Power Company) donated $40,000 to the consortium, "because they felt it was very beneficial for the economic development of the area," relates Mattson. She adds that another funding source was the South Dakota Board of Regents, which kicked in $46,000 to be used for the purchase of other equipment.

Jay Bender, chief operating officer at Falcon Plastics, credits Mattson's leadership for creating the consortium.

"We owe Carrie a lot for making this happen," he says. "We wouldn't be where we are today if it wasn't for SDSU's support. I'm excited about it. "It's a good feeling when students, faculty, and industry come together to benefit all parties."

Bender adds the project opens the door to other areas besides industry.

"There could be all kinds of new opportunities, like medical applications for certain pieces of equipment," he says. "For now, it's basically for manufacturing. The beauty of it is we can bring in a sophisticated piece of technology that students have access to. It's a nice addition to SDSU and the other engineering disciplines."

# SDSU, Otter Tail to study *wind power*

Developing alternative energy sources gains importance as the United States seeks to address its power needs, especially this year with rising electrical rates and power blackouts in parts of the country.

One answer could be wind power generation. Under the coordination of engineering professors Steve Hietpas and Mike Ropp, SDSU and Otter Tail Power Company have joined forces in an effort to research and examine the use of wind power turbines.

Otter Tail, with headquarters in Fergus Falls, Minnesota, supplies electricity and energy services to nearly a quarter million people in 423 communities and rural areas in western Minnesota, eastern North Dakota and northeastern South Dakota.

Otter Tail is one of ten companies belonging to the Center for Power Systems Studies within the Electrical Engineering Department. The center provides funding for student scholarships, research projects, faculty, and faculty development.

In support of the center, Otter Tail donated $15,000 to the department for a research project designed by Hietpas and Ropp to study what effects wind turbines may have on Otter Tail's power system.

"Otter Tail contacted me and asked if I would be interested in receiving funds to do a project that would be mutually beneficial to our department and Otter Tail," says Hietpas, who also serves as coordinator of the Center for Power Systems Studies.

Otter Tail is anticipating having its first wind turbine on-line this fall near Hendricks, Minnesota. According to Robert Endahl, division engineer at Otter Tail's branch office in Milbank, depending on wind power isn't as simple as it sounds.

"If enough people are interested, more will be built," says Endahl, who earned his electrical engineering degree from SDSU in 1975. "It will be interesting to see the results of the research project, because a lot of questions have to be answered before we move ahead.

"What happens when there's a sudden burst of wind and then disappears?" asks Endahl. "When there's fluctuation like that from the source, you have to develop ways to balance the power out. The generation has to match the load. These are some of the things we will learn from the study."

Rod Scheel, vice president of delivery systems at Otter Tail, says SDSU's research will go a long way in determining the future of wind power.

"The project will give us an opportunity to access wind generation," says Scheel, who earned his master's degree from SDSU in 1973. "We don't have any significant wind power right now. The studies should be helpful; making sure our power system performs reliably as we serve our customers."

The research project will show how Otter Tail's power system reacts when wind turbines are added to the company's power grid. By utilizing a computer model, the study will focus on how the turbines may affect voltage and power quality along with determining the best places in the state to erect them.

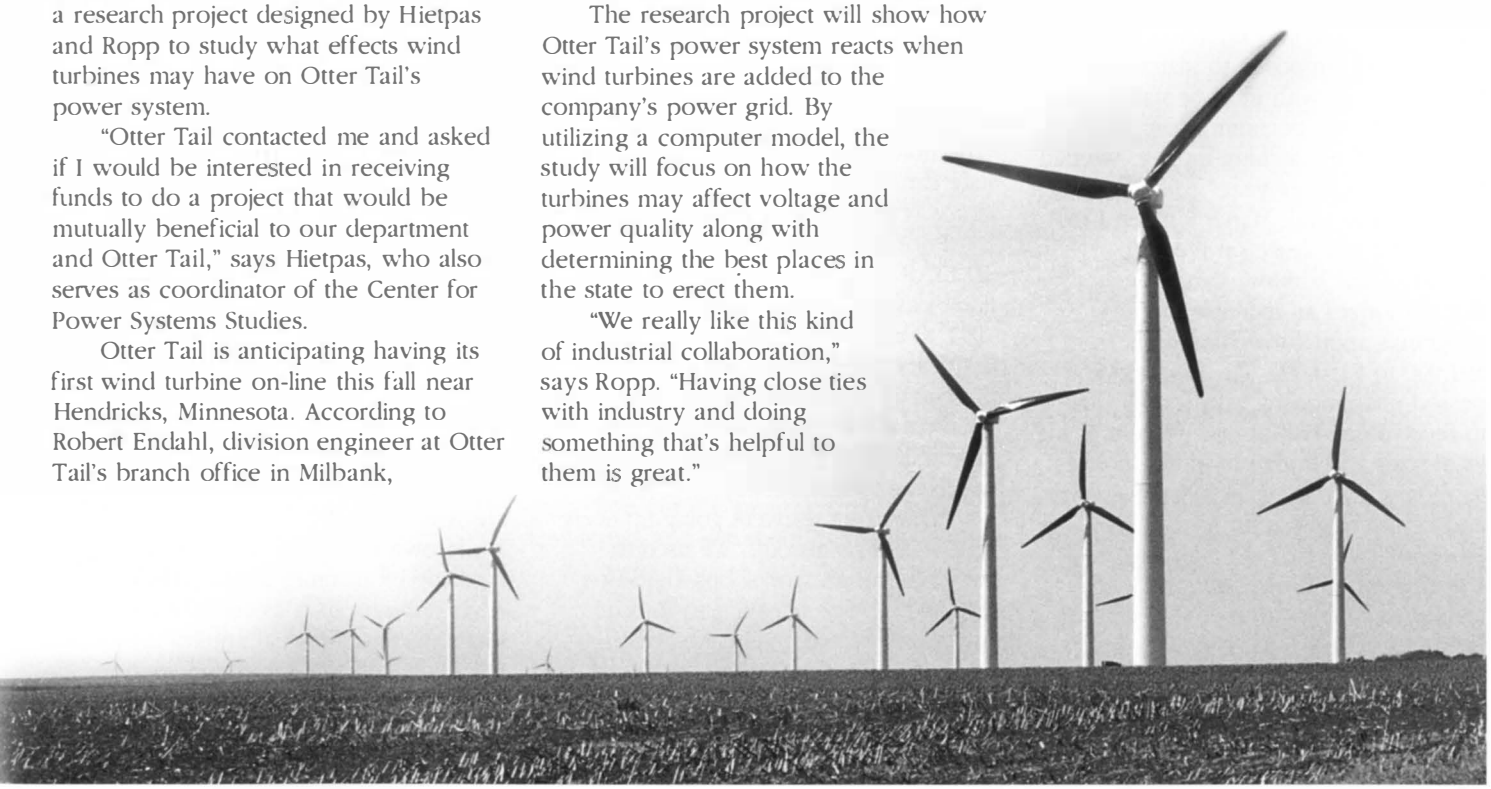
"We really like this kind of industrial collaboration," says Ropp. "Having close ties with industry and doing something that's helpful to them is great."

The first step called for purchasing an educational software package into which data will be placed about Otter Tail's physical power system infrastructure, ranging from distribution lines to transformers. Once the computer model is established, fictitious computer-simulated wind turbines can be created and placed in the computer model.

"The computer software will give us an idea of where the wind turbines should be placed in the state for the best possible efficiency," observes Hietpas. "It will also tell us what the impact would be on their current system.

"Our task is to essentially take their data base, which has all the information on their electrical components, adapt that information and build the electrical model that is suitable for use with the alternative transients program software."

Hietpas says the connection with Otter Tail is a perfect example of industry and the University working together for a common goal. "We have a good relationship with Otter Tail and they have been big supporters of our program."



# Persistence pays off

## for Selim with increased funding for SD LTAP

The program was getting down to the bare bones and Ali Selim wasn't about to let it starve.

"We were getting down to a skeleton budget, really," says Selim. "We needed to do something about it. We are pretty proud of our operation here."

Selim, a professor of civil and environmental engineering, is the director of the South Dakota Local Transportation Assistance Program (SD LTAP) at SDSU.

LTAP, an outreach service program provided by the College, is one of the fifty such centers in the nation. There's also one in Puerto Rico and six more centers serving tribal governments.

LTAP centers, which are financed jointly by the Federal Highway Administration (FHWA) and state/local organizations, receive the same amount of federal money every year. This year, each center across the country was allocated $125,000.

While the program couldn't exist without federal dollars, Selim acknowledges the difficult part was balancing the money equation.

"We are supposed to match the federal money with local or state funds," he says. "It was becoming very hard for us to raise the matching money. We had to fight for it every year."

That was until March 5 when LTAP received a new lease on life with Governor Bill Janklow signing legislation that authorizes an increase in the program's annual matching grant from $91,000 to $150,000. The bill, which passed unanimously, calls for SD LTAP to receive one-half of one percent of the local road and bridge fund that derives its money from the state's license plates and vehicle registration fees.

Sponsored by the South Dakota Department of Transportation, South Dakota School of Mines and Technology, FHWA, and SDSU, LTAP provides information and technical assistance to counties, small municipalities, townships, and cities in South Dakota for road and bridge construction and maintenance.

"Fortunately, the political climate in Pierre was just right this year. With more money coming in from the local road and bridge fund due to recent increases in vehicle registrations and license plate renewal fees, everything fell into place for additional funds for the program."

Ali Selim
Director of South Dakota Local Transportation Assistance Program

"The purpose of LTAP is to link transportation technology with local governments to keep local officials informed about new publications, techniques, and training opportunities that are helpful to them and their community," says Selim, who initiated the program in 1988.

"The whole idea for LTAP centers is to build enough expertise within local government entities in small towns by calling our office and asking for technical assistance about their roads and bridges at no charge," Selim adds. "The unique feature here is that every state can design its own LTAP program in a way that best suits the customers."

Prior to passage of the March bill, SD LTAP was receiving the same $91,000 grant passed by the state legislature in 1991. Consequently, with no increase in ten years, Selim says it was becoming difficult to maintain an adequate staff, to keep pace with inflation, not to mention raise the additional funds necessary to match the federal money.

"Our expenses were going up every year," Selim points out. "We used to collect fees from workshops, but since 1991 we provide our services for free, based on the recommendation of our advisory board. The cost of salaries, publications, travel expenses, and supplies were increasing so we needed help.

"Fortunately, the political climate in Pierre was just right this year. With more money coming in from the local road and bridge fund due to recent increases in vehicle registrations and license plate renewal fees, everything fell into place for additional funds for the program."

LTAP is divided into "five strong programs," according to Selim. They are training and workshops, newsletters, department visits, technical assistance, and a library.

Workshops, which number close to 100 per year and presented at various locations throughout the state, cover such topics as gravel roads, equipment management, culvert installation, surveying, asphalt paving, safety awareness, and fixing potholes. Using a mailing list of more than 2,000 names, notices are sent to local government officials concerning future workshops.

SD LTAP has a toll-free number (1-800-422-0129) where local officials can call in for technical assistance with any road and bridge maintenance or rehabilitation problems.

The program's newsletters, which are written locally by staff members, are known nationally for their content. Published four times a year, articles cover subjects such as construction methods, new material applications, maintenance techniques, and success stories. Special technical bulletins are also published about innovations and technology for highways and bridges.

# TRIAXIAL machine

## *gives new meaning to materials testing*

It is the only one of its kind and the role it plays will prove vital for those wishing to make technological advancements in the 21st century.

"As far as I know this is the only machine in the world that's capable of performing these tests," says Jeff Welsh, assistant professor of mechanical engineering. "Very few people know about this. It has taken a while to get the word out there through journal publications and conference meetings."

Welsh is referring to the triaxial machine, a state-of-the-art piece of equipment that he designed and built as part of his dissertation project while attending the University of Wyoming.

Standing thirteen feet tall and weighing 8,000 pounds, the machine is housed in the dynamics systems laboratory on the first floor of Crothers Engineering Hall. The College purchased the machine from the University of Wyoming in the fall of 1999 and was shipped to SDSU in the summer of 2000.

"It was great to build something like this from scratch," says Welsh, who earned his bachelor's degree (1993), master's degree (1995), and doctorate (1999) from Wyoming. "It's an opportunity to work with a system that will answer a lot of people's questions."

The triaxial machine, used for research and advanced course work by graduate students, tests the strength characteristics of composite materials.

Machines exist now that test composites for strength, but in only one direction. The material testing system (MTS), located in the heat power laboratory on campus, tests the mechanical properties of materials by pushing, pulling, and twisting.

The triaxial machine is unique because it was built to test composites in three different directions at the same time—push, pull, and diagonal.

Composite materials are made of fibers embedded in plastics. Most common fibers are carbon, glass, boron, and kevlar. Unlike steel, which has been around for about 200 years, composites are still relatively new, dating from the mid-1960s.

"There was a need to build this machine because there's no capability in the composite community to perform these tests," points out Welsh. "Since these materials are so new, people don't know how they react under certain stress conditions.

"Metals are fairly uniform when they are pulled in any direction. Composites do have a directional preference. We want to determine what that preference is and the different strengths in those directions."

The triaxial machine can apply 30,000 pounds of tension or compression in any direction to a composite test specimen that rests on the machine's centerpiece measuring only an inch square.

"This machine can detect loads as small as half-a-pound in resolution," notes Welsh. "Say we have 15,000 pounds on there. Is that 15,000 pounds plus or minus 200 or 400? In this case, it's 15,000 plus or minus half-a-pound. It's a very precise piece of equipment."

Examples of items made from composite materials range from table tops, golf club shafts, tennis racquets to landing gear on aircraft.

"We cut out small pieces of bulk materials and test them," explains Welsh. "We really want to be able to simulate the stress load rates in the lab to see how these materials react to three dimensional stresses."

Composites have not only been found to be stronger than metals, but they are lighter as well. It's been documented that fiber materials made of carbon are three times as strong as steel and weigh one-third as much. Kevlar, one of the strongest fibers, is used in bulletproof vests.

"Their mechanical properties are far superior to conventional metals and that's why people use them," observes Welsh, "but they are usually used in very high-tech applications."

Welsh says the main motivation for using composite materials is performance, especially for military aircraft and satellites.

"There are things we can do with aircraft that we could not do before because of these materials. Most of the stealth technology and other high-performance planes are based on composites, like the aircraft's exterior skin or the structural components inside."

Welsh acknowledges it will be several years before composite materials are available for common everyday use due to costs and fabrication techniques.

"Composites are very expensive materials and they are difficult to make," he says. "As people learn more about the materials, and how they are made, the prices will come down. That's what we are starting to see in areas like sporting applications. There's a lot of uncertainty out there concerning these composites and that's why it's important to study them."

Welsh concludes, "There's been a lot of support for it by the department and the University. They recognize there's an opportunity to do some novel research here."

# 'Wizard' wins

## Service Award from S.D. Science Teachers

Considering who won this year's Service Award from the South Dakota Science Teachers Association, perhaps a plaque wasn't the appropriate memento.

Maybe someone should have mounted a frozen banana or an electric pickle. Those are both props physics Professor Larry Browning uses in his "Wonders of Science" presentations, attention-grabbing demonstrations that have earned Browning the tag "the wizard of physics."

With a black cape, a star-covered pointy hat, and a flashy round of physics experiments, it's an appropriate title.

Each year Browning performs a half-dozen demonstrations of scientific wizardry, conducts several "star parties," and for the last three years has co-directed a two-week summer workshop. For these many hours of work outside his regular teaching duties, Browning received the Service Award at the February 1-3 association meeting in Huron.

"It was a total surprise. I didn't know about it until they said 'and this year's winner is,'" Browning recalls.

### • The birth of a wizard

His role as science wizard pre-dates his arrival at SDSU in August 1990.

"When I was teaching at Marquette [University], some of my friends and students were talking about what they remember from lectures. One of the guys was suggesting I use flashpots to emphasize a point. I said, 'Well, I've got this cap and gown that isn't much good except at Halloween.'"

Browning didn't go with the flashpots for classroom lectures, but he did make a wizard hat and put on his PhD cap and gown when the Marquette physics department would get a request for a science program.

"When I came to South Dakota, I was on the Engineering Expo committee and they suggested I put on this program."

That was 1991 and the high school teachers who saw Browning's demonstrations at the Expo shared the word with other teachers. Requests for Browning from area schools soon followed. And not all of his demonstrations have been in the area. Once he got a call from Pollock, by the shadow of the North Dakota border, almost 300 miles from SDSU.

### • Freezing their attention

The Pollock teacher had been a member of Browning's distance learning class in astronomy. To the request, Browning said, "'Sure, I'll bring some liquid nitrogen.'"

It's the liquid nitrogen that causes hot dogs and bananas, when dipped in the "steaming" fluid and thrown on the floor, to shatter into pieces like a glass dish. Browning's electric pickle trick takes advantage of the sodium inside the condiment to carry electrical current.

While he uses simple props and the presentations only last fifty minutes, transforming in the "wizard of physics" is no small commitment for Browning.

"Each one is probably a half day of my time. The small part is actually putting on the show. There's the preparation, transportation and tear down," the Kentucky native shares.

### • Not just a day job

Star parties, which let city dwellers discover the constellations hidden by a galaxy of street lights, security lights, and fluorescent lights, takes less preparation, but obviously requires Browning to commit time beyond the normal work day. Still he volunteers.

"I'm just interested in helping children understand science and not fear it. And the earlier you can have an influence on them, the better. You've got these fresh, young minds eager to find out how things work," he observes.

# ALUM wins invention awards on three continents

A 1991 and 1993 civil engineering graduate has found that the hard road to success is a hard paved road.

Ratnasamy Muniandy has received three awards for his research in mixing the fibers from the oil palm tree with asphalt to make a stronger pavement—stone mastic asphalt.

In May, Muniandy earned a gold medal at the Invention/New Product Exhibition in Pittsburgh. He also received a gold medal at the November 2000 ITEX competition in Malaysia for the same research, and took a silver medal in Geneva. The research took another gold medal at the 2000 Katahira competition in Tokyo.

Muniandy attended SDSU from 1986 to 1993 and earned both his undergraduate and graduate degrees. After graduating, Muniandy returned to Malaysia and began teaching highway and pavement engineering at the Universiti Putra Malaysia.

He began preliminary research of asphalt additives at SDSU with Ali Selim, director of highway technology and civil engineering professor. Muniandy continued his research after returning to Malaysia.

Since 1995 Muniandy has been working to find a fiber that can be added to keep the asphalt and aggregate mixed together until it solidifies. In addition to teaching highway pavement engineering, Muniandy also works with the Ministry of Science, Technology and the Environment in Malaysia to develop better asphalt for use on Malaysian roads.

Increasing traffic has taken its toll on Malaysian roadways. The roads have problems with cracking and developing ruts.

In 1999 Muniandy discovered that the empty fruit bunches from the oil palm tree, when made into a pulp, had the correct consistency to keep the asphalt from sinking to the bottom of the mix and the strength needed to withstand the rigors of heavy equipment and traffic.

An added bonus for the Malaysian environment is that the empty fruit bunches are a waste product.

Muniandy's patented invention has become a reality. Four hundred kilometers of road have been paved using his stone mastic asphalt.

His research at the Universiti Putra Malaysia has been noted around the world, including SDSU. Selim, his mentor, and Muniandy are in the beginning stages of creating a joint pavement research project with the two schools.

# *In memorium*

The joy brought by the arrival of spring in March was tempered this year by the deaths of five local residents with close ties to the College.

**Al Biggar** of Brookings, a fabrication technician with the Civil Engineering Department from 1958 until his retirement in 1985, died March 5, at Southridge Health Care Center in Sioux Falls.

Biggar, 83, had been a resident there since October 2000. He was born August 22, 1917, in Trenton Township, Brookings County, to Morris and Matia (Schlobohm) Biggar. He married Faye Wagner on June 11, 1941, and farmed in Trenton Township. Then they moved to Brookings and he began work at SDSU.

Survivors include sister Maxine Dornbush and her husband James, a retired SDSU engineering professor, of Brookings.

Retired Civil Engineering Professors **Paul Koepsell** and **Lorys J. Larson** both died March 17. Koepsell, 70, of Brookings, died at the Brookings Hospital. Larson, 84, died at his Brookings home.

Koepsell taught at SDSU from 1957 to 1997. He was director of the university computing center and worked on numerous engineering and consulting projects. The Canova native earned his bachelor's degree in civil engineering from SDSU in 1952. That same year he married his high school sweetheart, Delores Johnson.

Survivors include his wife, two sons, Steven and Royal; a daughter, Pamela Koepsell, and three grandchildren.

Larson taught at the university for twenty-three years, from 1957 to 1980. He also earned his bachelor's degree in civil engineering from SDSU in 1939. He then spent eight years in the United States Marine Corps, achieving the rank of lieutenant colonel. Afterwards, he worked as a Brookings businessman until joining the College.

Survivors include his wife, Norma; two sons, Darrell and Duane; two daughters, Shirley Hendricks and Sandi McKim; and seven grandchildren.

**Helen S. Duffey**, wife of retired physics professor George Duffey of Brookings, died March 8 at Select Specialty Hospital in Sioux Falls.

Duffey, 80, was born July 5, 1920, at Providence, Rhode Island. In 1942, she graduated from Pembroke University, which is now Brown University, with a math degree and a chemistry minor. She married George Duffey on September 17, 1945, in Newport, Rhode Island. They then moved to Brookings, where Mrs. Duffey taught one term of English at SDSU and finished the year teaching in the math department.

Survivors include her husband, a son, James; a daughter, Ann Gibson; and three grandchildren. She was preceded in death by a daughter, Mary.

**Dee Kitterman**, wife of John Kitterman of Aurora, died March 10 at Avera McKennan Hospital, Sioux Falls.

Kitterman, 60, was born October 6, 1940, in Manhattan, Kansas. She was a music major at Kansas State University in Manhattan. On June 4, 1960, she married John Kitterman in Manhattan. In 1983 the family moved to Brookings, where her husband began work as an associate professor in the Physics Department. In 1995 they moved to Aurora.

Survivors include her husband, two daughters, Karen Moore and Julie Markovetz; a son, John; and seven grandchildren. The Kitterman were guardians for one of their grandchildren, Nicholas.

# Hometown service

## Choir reaches Europe thanks to civil engineering graduate

For co-pilot Lyle De Jong, a thirteen-year veteran with Northwest Airlines, most flights from Minneapolis to Amsterdam are no more memorable than last night's dinner.

But March 1 was different.

De Jong, a 1976 civil engineering graduate, was guiding an aircraft that included about eighty members from his alma mater, including the sixty-member Concert Choir that he was a member of in 1972-73.

Co-pilot Lyle DeJong '76 with choir members, from left, Erin Meier, Amanda Veurink, and Jo David after landing in Amsterdam.

He went back to meet choir director Charles Canaan. "I told the choir director, 'I went to SDSU.' He said, 'Oh, where ya from?' He turned around and said 'Who we have from Platte?'"

That choir member who shares a hometown with De Jong was Amanda Veurink, a music education major.

"I was half sleeping when he came down the aisle. At first I thought I was in trouble because here's this pilot being introduced to me."

They didn't know each other, but "she knew a couple of my younger sisters. It turned out her mom is a sister to the lady that married one of my cousins," De Jong recalls.

The opportunity to co-pilot a flight with a large SDSU delegation was a new experience for De Jong.

For Veurink, "It was kind of a fun way to start the trip" and gave her a good story to share when she called home. "I told mom and dad right away. They thought it was neat."

Apparently, so did many of the 1,300 residents of the south-central town of Platte. "People in town were excited," says Veurink, who will graduate in December. A picture of Veurink and De Jong in the cockpit with a couple of her friends was sent to the town's weekly paper.

De Jong notes, "Most of the time we don't see the people we get on board." But the flight attendants had received a note from another flight attendant to say "hi" to the SDSU choir because her son was among the members making the ten-day, spring-break trip to Scotland and England.

DeJong, now of Albuquerque, New Mexico, spent thirty minutes with Canaan and Alumni Association Director V.J. Smith reliving his years at SDSU, especially his engineering days and the impact Jim Dornbush, a retired professor of civil engineering, had on his life.

# Phonathon: *new location, new record*

The 18th annual Phonathon moved to new quarters this February and the weeklong fund-raiser brought in a record total of $168,475.

The goal was $165,000. The new record is 19 percent more than the old mark of $141,442 set last year. Pledges have grown 34 percent since 1999.

Previous efforts have been staged from the basement of Pierson Hall, where a bank of sixty-four phones was set up in the dormitory. This year's calling was done from the SDSU Foundation's Call Center.

The computerized calling center eliminated the need to dial the eleven numbers needed to make a long-distance call.

So, even though there were only sixteen phones at the Call Center, the work was expected to go faster, hence the higher goal, according to Barb Dyer, who helps coordinate the event from the dean's office.

Two students were assigned to each phone during a shift and there were three shifts per night, she says.

Phonathon dollars keep the College operating at a peak level.

Teresa Kub, student chairperson for the Phonathon, says, "This year we were focusing our Phonathon efforts on student scholarships, equipment upgrades, and special projects which are only possible with private support. These projects include the Engineering Expo, publication of the *Impulse*, and student chapter activities."

Kub directed the Phonathon with Chuck Tiltrum, who again served as faculty adviser.

# *Donation enhances*

## mechanical engineering design teams

When Henry Callihan came back to SDSU in 1990, he was amazed how the university had grown since he was a student. His impressions eventually led to a decision that greatly enhances the higher education process.

"It's a growing institution, that's for sure," says Callihan, who visited his alma mater for the first time in fifty-one years after earning his mechanical engineering degree in 1939. "The campus is huge compared to when I was there.

"So many of the buildings aren't there anymore. The dorm I lived in was right across from the Campanile. One of my favorite memories was those bells waking me up every night. I was unhappy about that, but it sure was a beautiful sound."

Thanks to a $100,000 donation by Callihan to the College, the Crothers Engineering Hall addition will house the Callihan Student Design Laboratory. The money will be split between expenses surrounding student design contests and equipment for the addition.

"I would like to leave a legacy and express my appreciation for what the school did for me," relates Callihan. "Pretty soon, I hope to fund some mechanical engineering scholarships, too. By helping to build a lab and create scholarships, I want students to have the same opportunity that was given to me. I'm happy that I'm in a position to do this."

Callihan, who retired in 1975 from the Convair division of General Dynamics in San Diego, is also sponsoring the Lucile Callihan Memorial Garden at McCrory Gardens in honor of his late wife. The garden will match closely as possible the California floral look of the couple's back yard.

Don Froehlich, professor and head of the Department of Mechanical Engineering, appreciates the size and scope of Callihan's gift.

"This new lab is where our mechanical engineering students will get the opportunity for hands-on design experience and prototyping of devices and products," he says. "Students are organized into design teams during their sophomore and senior years. They've been successful in regional and national competition. The Callihan Design Lab will make us all the more effective."

Callihan attended grade school in Artesian. Later his family moved to Sioux Falls, where he graduated from Washington High School. After earning his engineering degree, Callihan's ambition was to design engines for major car companies. However, much to his dismay, his goal was not achieved.

"There wasn't much counseling done at that time on postgraduate work opportunities," observes Callihan. "Car companies weren't interested then in a graduate engineer from an agricultural school. An uncle, who was a general in the Air Force, tried to help and wanted me to go to West Point. But, I couldn't get in there because I was nearsighted. He then suggested I try an aircraft company so I sent my resume to the Convair division of General Dynamics."

Callihan was at General Dynamics for thirty-six years, working his way up from design draftsman to chief of mechanical design and aircraft ground equipment. Supervising as many as 250 people, Callihan was responsible for designing engine installations and related systems for bombers, fighters, and air transports.

During the height of World War II, about 45,000 people worked at General Dynamics, turning out eight B-24 bombers every twenty-four hours. The busy schedule made the work environment buzz with a sense of urgency, according to Callihan.

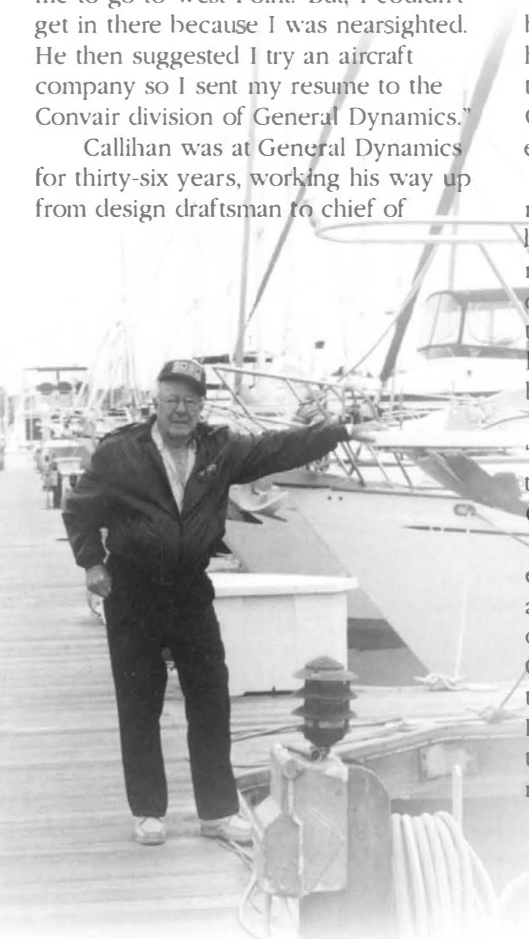
"We were making decisions which could adversely affect people's lives," he says. "The pressure to design at the weight allowed, and under cost, was very high. There was a lot of competition between companies and everybody pushed it to the limit. There was intensity in the work place, but everybody would pull together and work as a team."

Callihan has always been fascinated with mechanical objects such as cars and boats. A self-described "water person," he quickly developed a deep passion for the ocean and boating when he got to California and has been an avid sailor ever since.

Callihan's past is rooted deep in the mechanical world. His grandfather's brother, Edward Scott Callihan, earned a reputation as an inventor. Operating out of a shop on his farm near Woonsocket, the elder Callihan designed and built a horseless carriage in 1884—twelve years before Henry Ford built his first one.

A number of Edward Callihan's "mechanical triumphs" will be on display through a series of pictures at the Callihan Student Design Laboratory.

"Compared with my ability as an engineer, Scott was in a class by himself and could truly be called a genius, the only one in the family so gifted," says Callihan modestly. "That car could be the first one in the world, I don't know. He designed a lot of farm machinery, too, that was probably ahead of machinery produced by John Deere."



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Contributions have made possible the development of activities that have won recognition for the SDSU College of Engineering as one of the nation's leaders in engineering education.

We have benefited, and those who have been generous in their gifts share with us the satisfaction that comes from achievements of our faculty and students.

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# *'Nothing* steers *like a* Giere'

## *Patented coupling allows alum to produce unique tractor*

Today, David Giere can be called an entrepreneur, an inventor, and an engineer. In the 1980s he was a homeowner frustrated by the difficulty of mowing his hilly Twin Cities lawn.

"Every time I had a downhill runaway on my lawn tractor or would start spinning the tires and damage the grass, I saw the need for a four-wheel drive riding lawn mower. . . . I thought, 'There's got to be a way to come up with a four-wheel drive tractor without charging a guy $14,000,'" Giere, now of Wilmot, says.

He thought about the need for several years.

In 1994 he left his job as the chief engineer with a commercial riding mower manufacturer in central New York and returned to South Dakota to turn his years of thinking into product. That took five years. The first Mountaineer tractor rolled out of Giere's Ortonville, Minnesota, plant last year.

The 1979 mechanical engineering graduate is continually working to establish a market for his unique product.

### • Nothing else out there like it

What distinguishes the Mountaineer from other mowers on the market is a patented flexible coupling that is part of the steering, drive assembly on all four wheels. It allows the tractor to have four-wheel drive, four-wheel steering, and four-wheel braking.

By using the flexible coupling rather than universal joints that would be found on automobiles, Giere could produce tractors that are far less expensive than its market rivals.

The base model for the Mountaineer, which weighs 800 pounds and uses a gasoline engine, sells for $7,500. That compares with a much bigger John Deere utility tractor, which weighs 4,275 pounds, requires diesel fuel, and sells for $15,000.

### • Gaining a name in New England

Getting a new name introduced to the market has been his company's biggest challenge, Giere says. But the venture has a growing network of service dealers. The mower was first introduced in New England, where there was a very interested service dealer, lots of residential mowing on hills, and lots of people, Giere says.

The company now has expanded south and west with sales representation in twenty-five states.

In 2002, Giere hopes to begin marketing overseas. In addition to tapping into another revenue source, that will allow for steadier production rates at the Ortonville plant. Now there is a winter frenzy as Giere gears up for spring and summer sales of the sixteen and eighteen-horsepower Mountaineer, and a summer production lull.

The company bills the Mountaineer as "a tractor you'll be able to use from January 1st through December 31st, year after year."

Giere adds, "It's an awesome snowblower with the four-wheel drive. It's a tremendous machine when it comes to traction and maneuvering."

### • Putting a patent on it

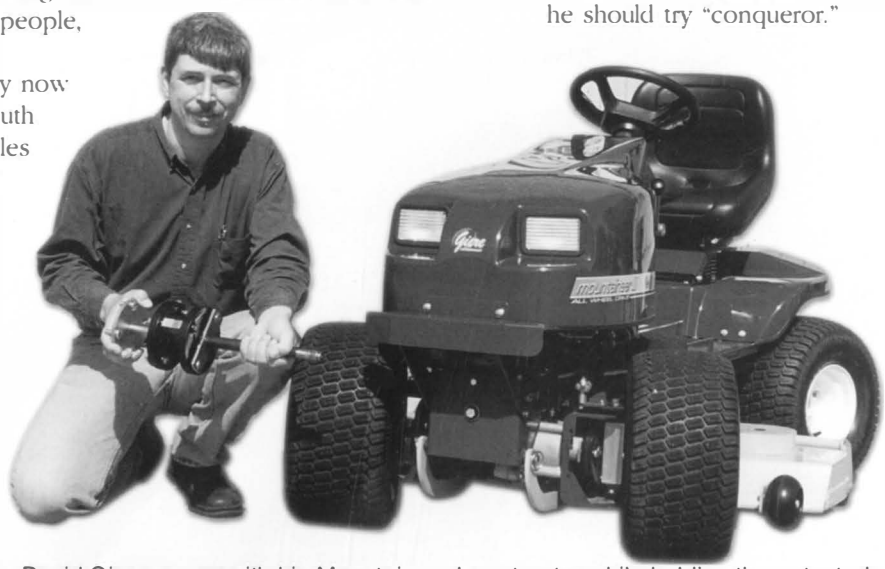
It is the flexible couplings that allow such functions. Those couplings serve the same role as a CV joint. "Our flexible coupling is constant-velocity—the same speed out as in, even when steering at a sharp turn," the engineer explains. In addition to price, advantages that the Giere coupling has over a CV joint are that it has no lubrications, no moving parts, and is very insensitive to dust, the Sioux Falls native says.

He has two United States patents on the product and is seeking additional patents.

"We have been watching the trade magazines and done extensive patent searches. We can't find any evidence that someone else has done this and has a coupling that functions the way this one functions. Ours is made for extremely high angles of deflection—up to 45 degrees."

That means the wheels can turn 45 degrees. "Although due to space constraints we limit our steering to 32 degrees, that is done on both front and back axles, so it's like having 64 degrees of steering," Giere says. This compares to a 35-degree deflection with cars, he notes.

While the Mountaineer owes its success to the coupling, Giere hasn't given the machinery piece a formal name. Considering how it makes homeowners the kings of their hilly lawns, perhaps he should try "conqueror."




David Giere poses with his Mountaineer lawn tractor while holding the patented flexible coupling that allows the mower to have four-wheel drive, four-wheel steering, and four-wheel braking.

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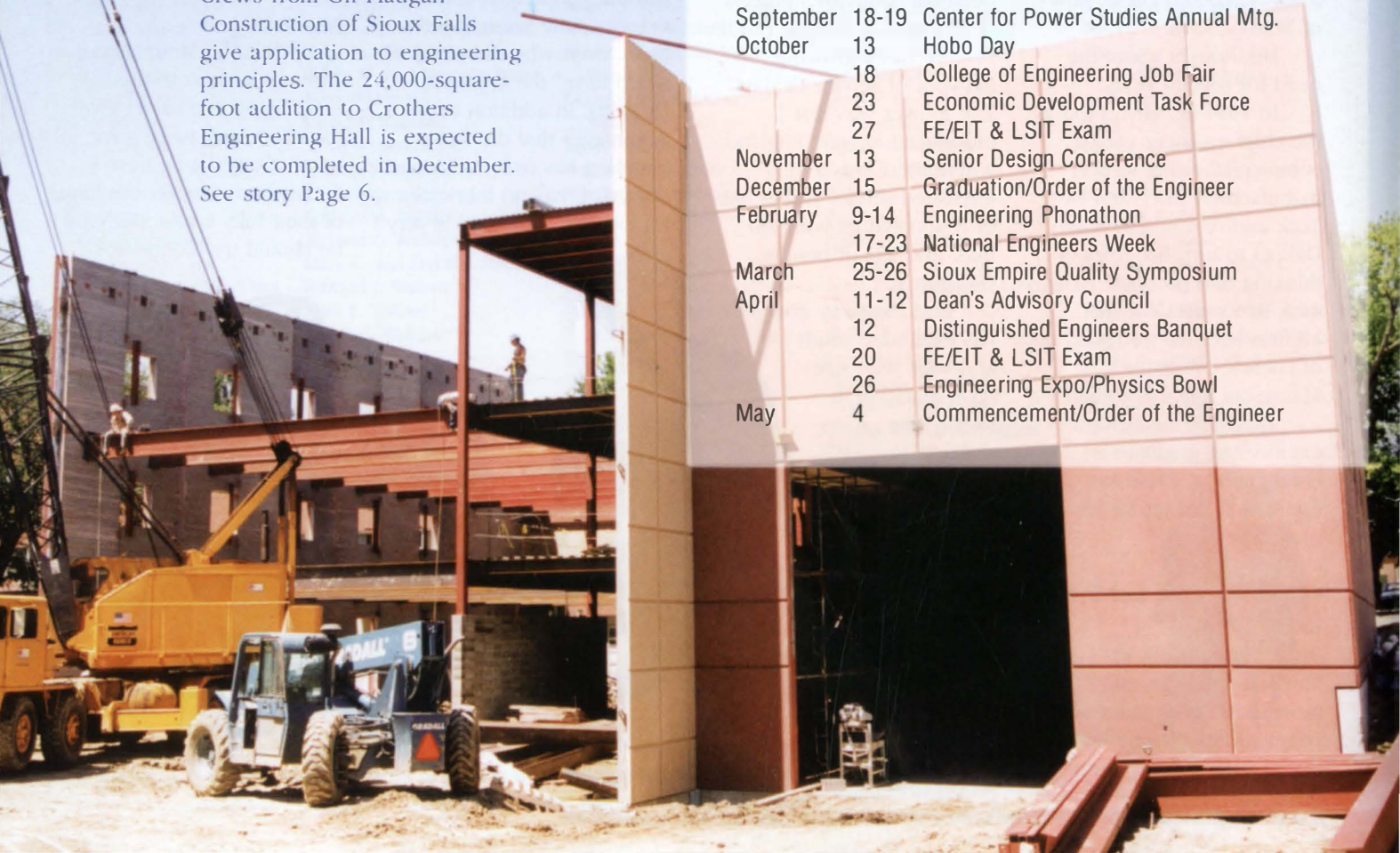

Crews from Gil Haugan Construction of Sioux Falls give application to engineering principles. The 24,000-square-foot addition to Crothers Engineering Hall is expected to be completed in December. See story Page 6.

| | | |
|---|---|---|
| September | 18-19 | Center for Power Studies Annual Mtg. |
| October | 13 | Hobo Day |
| | 18 | College of Engineering Job Fair |
| | 23 | Economic Development Task Force |
| | 27 | FE/EIT & LSIT Exam |
| November | 13 | Senior Design Conference |
| December | 15 | Graduation/Order of the Engineer |
| February | 9-14 | Engineering Phonathon |
| | 17-23 | National Engineers Week |
| March | 25-26 | Sioux Empire Quality Symposium |
| April | 11-12 | Dean's Advisory Council |
| | 12 | Distinguished Engineers Banquet |
| | 20 | FE/EIT & LSIT Exam |
| | 26 | Engineering Expo/Physics Bowl |
| May | 4 | Commencement/Order of the Engineer |