

Impulse

**College of Engineering
South Dakota State University**

Fall 2005, Vol. 3, No. 2



FROM THE DEAN



Dear alumni and friends:

As the 2004-2005 school year concludes and this issue reaches you, SDSU is completing its 125th year since the Territorial Legislature approved its establishment on Feb. 21, 1881. History shows that the alumni of the College of Engineering have expanded the bounds of human knowledge and positively impacted the world in many ways. As our 125th anniversary date approaches, you will see more details on how we will celebrate this milestone year.

As time keeps marching on, we sadly celebrate the end of the careers of some of our great professors as they retire, yet we take great joy in the mark they have made on so many young people. In this issue we are featuring those great retiring professors. We also feature

four very special alumni who were awarded our highest honor last spring as recipients of our 2005 Distinguished Engineer Awards.

One of the most recent significant accomplishments for SDSU was the establishment of its GIS Center of Excellence in collaboration with EROS. In this issue you will get an update on our progress and what it means for the College of Engineering.

As usual, this issue also features articles that relate to our many student activities, including our first annual Computer Science programming contest. You will also learn about some of our award-winning students and faculty. You may have heard this last year that IBM built the world's fastest computer, but you may not have known that one of our alums, Thomas Liebsch, was the chief engineer. You'll have to read our feature to learn just how fast the IBM computer performed.

Also, this is the issue where we annually highlight our donors. I want to thank all of you for your generosity and encourage your continued support. If you are not already a member of our Dean's Club, please consider becoming one and helping us continue to produce the best graduates in mathematics, engineering, science and technology. Your financial support is part of the lifeblood of the College of Engineering.

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

Lewis Brown, Ph.D.
Dean of Engineering



■ About the Cover

Matt Hansen, left, and Tom Loveland, co-directors of the Geographic Information Science Center of Excellence, pose by a huge revolving globe near the EROS Data Center entrance. The GIS Center begins its first year of operation this fall in Wecota Hall. Its mission is to achieve a level of professional recognition that establishes eastern South Dakota as the world's leading center for all activities related to geographic information science.

See story on Page 8.

Cover photo by Eric Landwehr.

■ Impulse

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Impulse

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GROWTH

Land of opportunity

Creation of engineering jobs brings new options

While the Rust Belt is getting rustier and Arnold is trying to rescue the Silicon Valley, South Dakota is transforming into a place where engineers can work during the peak earning years of their career. It's no longer just a place to train; it's a growing job market.

As graduation day approached, Dennis Helder's classmates were asking each other one question: "Are you going to Minneapolis or Denver?"

In 1980, there were not a lot of local options for graduates from the College.

Nationally, the economy was roaring. "It was a time of growth and expansion. Everybody had multiple job offers. I remember getting job offers without even an interview," says Helder, who earned an electrical engineering degree at State.

Of the half-dozen job offers the Canton native had received by graduation day, the only South Dakota employer recruiting him was Daktronics.

Helder ended up going to Waseca, Minnesota, to work for a smaller company, where he would do work he would enjoy and still be fairly close to home, he recalls. At E.F. Johnson, he worked on a project to build the first hand-held cell phone.

While Helder liked the work, within a couple years he was back in South Dakota—returning to school and farming.

Finding work at home

Today, students who graduate from the Electrical Engineering and Computer Science Department that Helder heads find a much different picture. On the Department's website there are sixteen South Dakota firms that are recent employers of SDSU grads.

For the past four years, 25 percent of the EE grads have stayed in state and half find work within a couple hours drive from SDSU, Helder says.

During the dot.com bubble, tech grads could get a job anywhere, he says of that 1998-2002 span.

Today, there are not quite as many job opportunities in sheer numbers as the engineering sectors continue to climb out of

the 9/11 slump and dot.com collapse. "But the students are still getting at least one job offer, if not more, and most of the job offers now are local to regional," Helder says.

Scoreboard maker Daktronics continues to be a leading employer for engineering grads and the firm has boomed since 1980.

Changed, but not completely

But a number of new companies and a steady growth among established firms have taken South Dakota from a state dominated by plows and presidential souvenirs and made it a place of ripening industrial and corporate development.

The transformation has been made without paying the price of lifestyle, several engineers say.

"You can be an engineer in South Dakota, make a good living, and have a little more of that small town feel," says Jackie Lanning, the city engineer for the City of Brookings and president of the South Dakota Engineering Society.

She grew up on a Yankton farm and was ready to see the world when she graduated from high school.

After she graduated from Colorado School of Mines in Golden, near Denver, she was ready to come home. "I just wanted to come back to an area that wasn't as hectic of a lifestyle with less crime and traffic," Lanning says.

She found that in Marshall, Minnesota, and, since 1990, in Brookings.

Coming home again

While the state may not have a Menlo Park reputation, alums removed from campus by a decade or two should not be caught off guard by the change. "If they've done their homework, they're aware that there are more opportunities now," Helder says.

And Helder's classmates and former students are doing their homework.

Dennis Derickson went on to get his doctorate and worked on the West Coast in fiber optics and laser diodes for telecommunications. "He called me up last fall and said 'We decided we want to get back to that part of the country and raise our kids,'" Helder recounts.

He also cited the case of a former student, Ron Morfitt, who went to work at EROS after graduation and then on to Raytheon aeronautics in Santa Barbara, California. "I got a call from him 2 1/2 years ago and he said, 'Boy, I really want to come back here,'" Helder remembers.

Morfitt ended up returning to a position at EROS Data Center north of Sioux Falls last year.

The I-29 backbone

Engineering firms have been drawn to the I-29 corridor, from Sioux City, Iowa, north through Sioux Falls and Brookings, and on to Watertown.

"Sioux Falls drives the market," says Dennis Micko, head of Banner Associates, the Brookings-based consulting engineering firm. Housing developments are sprawling to the north, south, and west of Sioux Falls while new technology firms have uprooted John Morrell's influence as the area's dominant employer.

But Micko, a national director on the American Council of Engineering Companies, adds, "We've seen similar growth elsewhere."

From Brookings to the world

That includes Brookings, where residential building permit values have hit record levels for the past three years and commercial construction values have seen higher spikes than ever before in the last ten years, city records show.

In Brookings County, the number of manufacturing jobs has nearly quadrupled since 1980.

Certainly, low interest rates and a growth-oriented economy, factors that have pushed national industrial development, have played their role in Brookings as well. But there is more to the story here in eastern South Dakota, according to Daktronics' Matt Kurtenbach.

"We've had really good growth of our businesses that have been in town for a while," says manufacturing manager Kurtenbach.

Daktronics is the best example of that. Founded in 1969 with six employees and

annual sales of \$2,352, the hometown business now is a publicly traded firm with nearly 1,900 employees and sales of \$230 million throughout the world.

Full-time employment has jumped twelvefold in twenty-five years—from 92 in 1980 to 1,156 in 2005—and another 495 students work part time.

Growth at Larson Manufacturing, the maker of storm doors and windows, has boomed from 50 employees in 1980 to 644 today. 3M, which makes health-care products at its Brookings plant, grew to 800 employees in 2000, not far from today's 750.

Small, but important

Also, "New businesses have come to town and some businesses have developed in a supplier mode to those [larger] companies," Kurtenbach says.

In terms of total employment, the brightest name in town is Rainbow Play Systems. The manufacturer of wooden playground sets moved here from Minnesota in 1995 with eighteen employees. It is now Brookings' fifth-biggest employer with 410 employees, and during seasonal production swings hits 700, many of them college students.

Kurtenbach adds that start-up engineering firms also have been a vital source for engineering jobs.

He cites the example of Measurement Technologies Laboratories, which came to Brookings last year. While the firm only hired four persons, three openings were for mechanical engineers, he says.

Tending development opportunities

But what makes these businesses look at Brookings?

Part of the answer can be found in the building where Measurement Technologies Laboratories is located. The Ron Reed Economic Development Center is a business incubator and also houses the Brookings Economic Development Corporation.

Kurtenbach is president of the corporation, which works with the city and the chamber to spur development.

In addition to the business incubator, the economic development corporation helps facilitate the sale of city-owned industrial park property to private firms, and helps businesses gain access to grants and state economic development funds.

Corporation board members also are helping to plan a research park at SDSU. (See related story Page 6.)

When pitching Brookings to prospects, tangibles such as financing factors, site characteristics, and a location at the intersection of Interstate 29 and U.S. Highway 14 don't get divorced for the soft factors—lifestyle qualities, says Kurtenbach.

"It's the total package in Brookings—quality school system, quality city services, and SDSU's presence, which brings entertainment, sports, young people to town who want jobs," Kurtenbach says. SDSU students supply an educated work force that provides labor while in school and upon graduation, he adds.

The University factor

And that labor supply is growing. Total enrollment is expected to top 11,000 this fall.

While the University has seen enrollment boom from 6,848 total students in 1980 to 10,954 in the fall 2004 headcount, the numbers within the College of Engineering show movement in the opposite direction, from 234 total graduates in 1990 to 168 in 2004.

The dynamics of a growing need for engineers and a downturn in engineering graduates increases demand.

Susan Fredrikson, employment development director at SDSU's Career and Academic Planning Center, says, "The market for engineers was extremely hot during the pre-9/11 days, and it's picking up again.

"Employers really like our students. Their strong academic training, common-sense approach to problem solving, and strong work ethic are just some of the qualities that keep them returning to recruit here."

Dave Graves

GROWTH STATISTICS

EMPLOYMENT

3M	2005	2000	1990	1980
	750	800	*	*

(*Specific numbers unavailable, but firm reports employing a range of 675 to 800 workers since mid-1970s.)

Larson Manufacturing	2004	2000	1990	1980
	644	851	157	50

Daktronics	2005	2000	1990	1980
Full-time	1,156	720	288	92
Student	495	245	80	1

Brookings major employers – June 2004

South Dakota State University	2,073
Daktronics (scoreboards)	1,500
3M (medical products)	720
Larson Manufacturing (doors)	644
Hy-Vee (grocery store)	450
Rainbow Play Systems (play sets)	385
Brookings Hospital and manor	350
Brookings School District	350
Twin City Fan (fans and blowers)	233
Brookings Municipal Utilities	214

Source: Brookings Economic Development Corporation website. Daktronics reports a current count of 1,875; 3M reports a current count of 750. Rainbow reports a current count of 410.

Employment by categories

	1980	1990	2000	2005
Manufacturing	1,226	2,059	4,541	4,765
Government	3,692	4,670	5,548	5,490
*Total	9,415	12,080	17,348	17,720

* Includes other categories. Numbers reflect non-farm jobs in Brookings County. 2005 figures from May. Source: Brookings Area Chamber of Commerce.

Manufacturing jobs in South Dakota

City	2000	1990	% change	job growth
Aberdeen	2,420	2,078	16	342
Brookings	4,430	2,059	115	2,371
Huron	975	1,302	-25	-325
Mitchell	1,840	1,651	11	189
Rapid City	4,600	4,300	7	300
Sioux Falls	14,000	9,700	44	4,300
Watertown	4,040	2,844	42	1,196
Yankton	2,705	2,146	26	559

Note: Statistics are at a county level. Source: Brookings Economic Development Association.

BUILDING PERMITS — City of Brookings

Year	2004	2000	1990	1980
Residential				
(# permits,				
# housing units)	117/138	45/70	22/56	43/118
(value)	\$15.8m	\$6.14m	\$2.4m	\$2.5m
Non-residential	\$20.7m	\$8.6m	\$8.3m	\$8.95m

Source: Office of the City Engineer, Brookings

GROWTH

While you were away

Brookings, SDSU develop economic, academic muscles

Like the scrawny neighbor boy who moved away as a ten-year-old and came back for a visit as a strapping 18-year-old, folks who missed seeing Brookings and SDSU grow up would hardly recognize the place.

The gravel roads, which extended Medary Avenue and Eighth Street South and served the industrial park, are all paved. Other streets in town are experiencing traffic counts in excess of 10,000 vehicles per day. Population grows even though family size shrinks.

Housing? Affordable and available are relative terms, but it is clearly a seller's market.

The median house price in Brookings for 2004 was \$116,000. That won't buy two bedrooms in California, but it does show what a great investment real estate has been in Brookings. The median value in 1990 was \$56,000, more than doubling in fourteen years.

"Homes have gone consistently up in value from 4 to 7 percent and even 10 percent in some areas," real estate agent Kevin Ishol says.

The reason is simple economics. "It costs \$170,000 to build a new home. There's only so many \$130,000 houses out there. Supply and demand. There are more buyers in the sub-\$200,000 market than there is supply," says Ishol, head of the East Central Board of Realtors.

Growth in good-paying industry jobs and at SDSU means that a \$170,000 home isn't for the elite.

The median household income stands at \$36,064, according to the Governor's Office of Economic Development website. That's up nearly \$5,000 from the numbers in the 2000 census and a jump of more than \$14,000 from 1990.

On the opposite side, the 2000 census reported that the percentage of families living in poverty was down to 7.3 percent.

Home Sweet home

Twenty-five years ago, when Horatio's was the place to party and long before the road to Volga became a four-lane, there was only one house in Brookings valued more than

\$150,000 and none went in the \$200,000 category, census data shows.

More than 40 percent of the 2,033 owner-occupied homes were in the \$40,000 to \$60,000 range.

By 1990, the median house value had risen moderately from \$45,000 to \$56,000, but there were nine homes valued in excess of \$175,000. None hit the \$300,000 level and 40 percent of the homes were in the \$50,000 to \$70,000 range.

Numbers from the 2000 census dramatically illustrate what happened to the housing market.

There were twenty-eight homes valued at \$300,000 to \$500,000. Another seventy-nine homes were valued at \$200,000 to \$300,000. Homes valued at \$100,000 to \$150,000 represented 25 percent of the market while homes valued at \$50,000 to \$100,000 represented 53 percent.

However, the total number of owner-occupied homes (2,506) had grown less than 500 in twenty-five years.

Head counts — City and State

That accounts for a modest population increase from 1980 to 2003, the latest estimate available.

Brookings grew 9 percent from 1980 to 1990 (14,951 to 16,270). The following decade brought a robust influx of 14 percent (to 18,504). But the 2003 estimate was down slightly (to 18,464), perhaps reflecting a trimming of fifty jobs at 3M and a general flattening of the economy at 9/11.

Like 69 percent of the school districts in South Dakota, the enrollment at Brookings has been falling.

But you wouldn't know that on the SDSU campus as the state's largest university just keeps growing, and most of that growth has been in recent years. State added more than 2,000 students between 2000 and 2004 (8,719 to 10,954).

In contrast, the University grew by less than 2,000 students in the twenty years between 1980 (6,848) and 2000.

Building a bigger school

The University's physical presence has steadily grown through the years. The gross square footage of academic buildings has moved from 1.4 million in 1980 to nearly 1.9 million in 2004 with small gains being reported each decade.

In addition to the growth in academic square footage, the space in revenue buildings also has increased. Revenue buildings include residence halls, the Student Union, the Foundation Seed Stock Building, and the Animal Disease Research and Diagnostic Lab.

The square footage in revenue buildings grew from 610,000 in 1980 to 870,000 in 2004.

What the numbers don't show is what that square footage embodies. They don't capture the glass-dominated, A-frame entryway at the state-of-the-art Northern Plains Biostress Lab, completed in 1993 for plant and wildlife related departments.

The numbers can't picture the beauty of the Performing Arts Center, a \$10.4 million project completed in August 2002 just northeast of Frost Arena. The center features a 1,000-seat concert hall and a 200-seat studio theatre as well as offices and a glass-enclosed lobby that gives the 62,000-square-foot building a distinctive look.

The numbers also don't capture the grandeur of the expanded and remodeled Student Union, which is just re-opening this summer, and Caldwell Hall, an upper-scale residence hall being completed in time for this school year.

Running with the big boys

State's changing face includes a beefed up athletic schedule with the Jackrabbits now competing in Division I.

That means schools such as Alabama, Wisconsin-Milwaukee, and Butler will be bringing their basketball teams to SDSU this season. This will be SDSU's second season in Division I and the women's basketball team has already distinguished itself, claiming wins over schools such as Kentucky and Alabama.

GROWTH STATISTICS

Building permit values

	Residential	non-residential	Total
2004	\$15.8 million	\$20.7m	\$36.5m
2003	\$12.5 million	\$7.0 m	\$19.5 m
2002	\$12.2 million	\$9.3 m	\$21.5 m
2001	\$6.5 million	\$22.5 m	\$29.0 m
2000	\$6.1 million	\$8.6 m	\$14.7 m
1999	\$6.9 million	\$11.2 m	\$18.1 m
1998	\$9.3 million	\$8.4 m	\$17.7 m
1997	\$7.0 million	\$31.7 m	\$38.7 m
1996	\$5.5 million	\$5.6 m	\$11.1 m
1995	\$7.0 million	\$5.6 m	\$12.6 m
1994	\$11.6 million	\$9.5 m	\$21. m
1993	\$6.3 million	\$3.2 m	\$9.5 m

Source: Office of the City Engineer, Brookings

HOUSING

Median housing values, owner-occupied, Brookings city

2004	2000	1990	1980
\$116,000	\$93,900	\$56,000	\$45,000

Source: U.S. Census report; East Central Board of Realtors for 2004.

1980 owner-occupied houses

Total units	\$40-60K	Over \$150K	Over \$200K
2,033	822	1	0

1990 owner-occupied houses

Total units	\$50-70K	Over \$175K	Over \$300K
2,224	889	9	0

2000 owner-occupied houses

Total units	\$50-100K	\$100-150K	\$200-300K	\$300-500K	Over \$500K
2,506	1,338	629	79	28	0

Source: U.S. Census report.

INCOME

Median household income – Brookings city

2005	2000	1999	1990	1989	1979
@\$36,064	@\$35,438	\$31,266	@\$21,929	20,184	13,671

@GOED website, summary report 6-22-05 for Brookings

Per capita income – Brookings city

1999	1989	1979
\$17,028	9,723	5,492

% of families below poverty level – Brookings city

1999	1989	1979
7.3	13.4	18.3

Source: U.S. Census reports unless otherwise indicated.

POPULATION

Brookings city population

2003	2000	1990	1980
18,464	18,504	16,270	14,951

Brookings county population

2005	2004	2000	1990	1980
@25,983	28,159	26,000	25,207	24,332

@GOED website, summary report 6-22-05 for Brookings

Source: U.S. Census reports unless otherwise indicated.

SOUTH DAKOTA STATE UNIVERSITY ENROLLMENT

2004	2000	1990	1980
10,954	8,719	7,642	6,848

the co-founder, explains why that is so.

“The overriding factor is the relationship with SDSU. That has really been the biggest factor for making Brookings attractive for a company like Daktronics.”

In that respect, there may still be some resemblance to that scrawny 10-year-old neighbor you remember.

Dave Graves

The 1980 Lake Placid Olympics marked Daktronics first entry into the international sports field. The Daktronics team at that historic Olympics included current chief executive officer Jim Morgan, fifth from left, and Al Kurtenbach, current chairman of the board, are right. At that time, Daktronics had ninety-three employees.

The Jackrabbits already have their first academic All-American at the University level—mid-distance runner Brad Lowery.

This spring he nearly became the first in South Dakota to run a four-minute mile. The fast pace he set is much like the strides happening in other areas of campus as well as in the community, which serves as good training partners for one another.

A great place to grow up

A classic example is at Daktronics, the scoreboard manufacturer founded by SDSU faculty.

In thirty-six years of business, the company has found Brookings to be the ideal place from which to grow a worldwide business. Manufacturing manager Matt Kurtenbach '92/'00, son of



GROWTH

What's the future hold?

Research park, other efforts provide support for continued growth

Lew Brown doesn't believe in gazing at a crystal ball, but the dean does have a sense of what the future will require.

When it comes to ensuring a promising future for engineering jobs in South Dakota, that means attracting a research park adjacent to campus and continued development of the SDSU Foundation's Enterprise Institute as well as similar entities.

A research park has been the focus of organized discussion in Brookings for three years. That talk got more serious in April, when representatives from Idea Partnerships were in Brookings for three days to collect information en route to developing a strategic business plan for the proposed research park on the east side of campus.

The \$150,000 planning effort has financial support from the state, city, county, and economic development corporation.

Brown earlier said, "We are the only state in the U.S. that does not have a university research park. I'm sure that every other land-grant university in the U.S. has some kind of research park with the idea of transferring research work into products and businesses."

He said those businesses that produce successful spin-offs are ones that work with

colleges of engineering, both the students and faculty.

"We intend to have a very active and fruitful relationship with the new research park," Brown says.

Research park near campus, highways

The proposed 134-acre park would be at the southwest corner of Interstate 29 and the U.S. 14 Bypass on land owned by the South Dakota Board of Regents. Land development and infrastructure costs have been estimated at \$7-\$8 million.

The report from Idea Partnerships, of Great Falls, Virginia, is expected back this fall.

"We've had a number of faculty members that have been able to take their products and develop a successful business," Brown notes. "What they haven't had before is the kind of lab and mentoring resources that a research park would offer.

"Now we'll have a place where faculty members can take the results of their research that can be developed into a successful business or work with existing businesses in Brookings to develop their products."

Assistance from Enterprise Institute Faculty members, as well as any other South Dakotan, can take efforts yet in the infant stage to the Enterprise Institute.

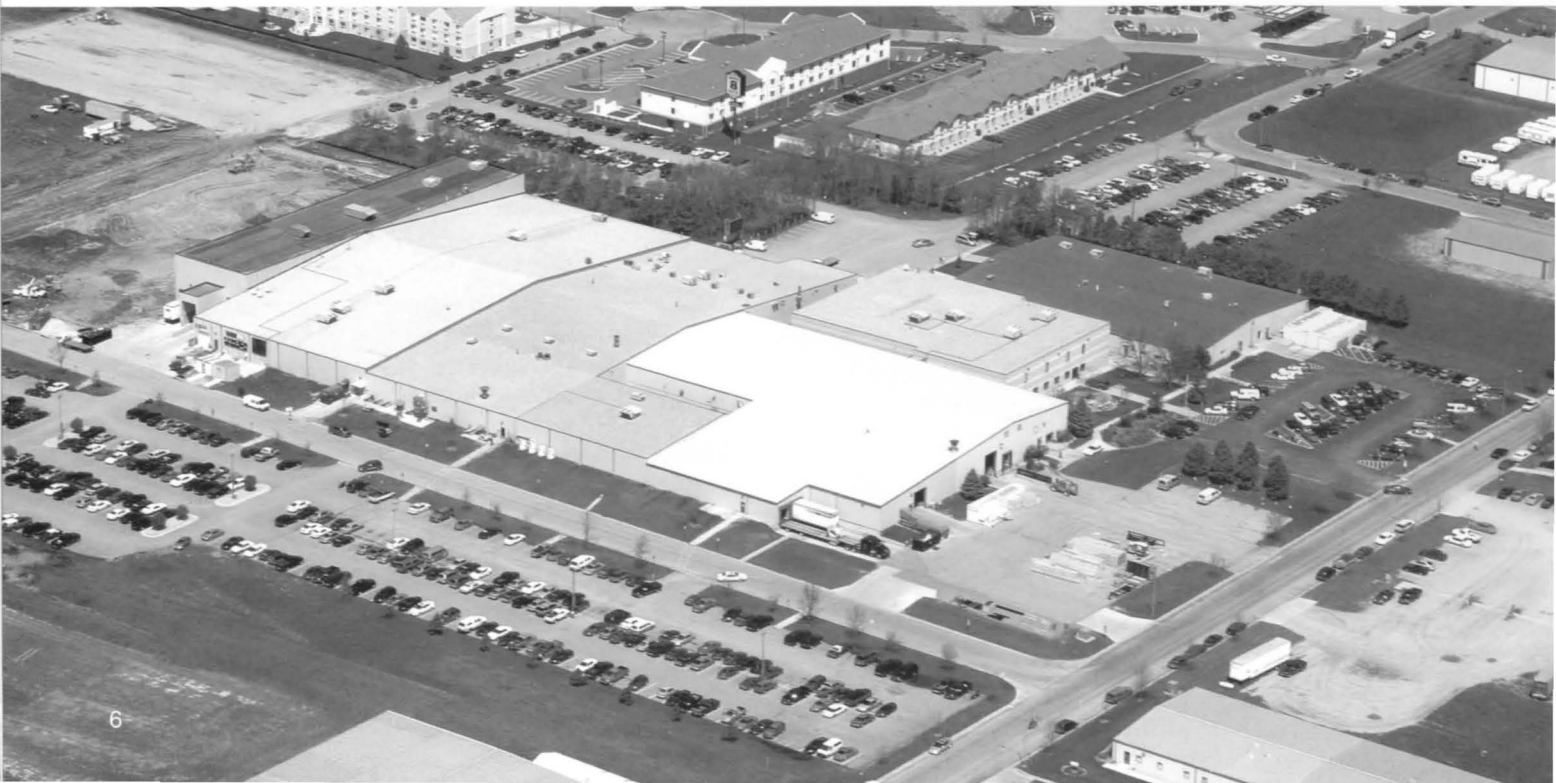
Founded in May 2001 by the SDSU Foundation, the Enterprise Institute has worked with more than 400 entrepreneurs and projects. Its purpose is to grow new business in the state through education and research, acting as a pre-incubator or the first stage in helping an entrepreneur get started.

It owes its beginnings to Duane Sander, dean of the College from 1990 to 1999.

"I felt it would be very useful if we could have an entity close to the University with the ability to utilize University expertise as well as business expertise," says Sander. "I didn't see an entity like that in South Dakota and felt it was something that would be really useful."

Located in a new building with the SDSU Foundation, the Enterprise Institute has twenty basement offices for clients.

This current photo shows how Daktronics has expanded, now at 368,000 square feet. It also shows the development of the industrial park and the retail businesses that have located north of Daktronics.



GROWTH STATISTICS

ENGINEERING DEGREES

Baccalaureate	2004	2000	1990	1980
Civil & Envir.	18	40	45	32
Electrical	24	18	53	38
Mechanical	28	41	41	15
Other Eng.				1
Physics	2	2	3	15
Ag Engineering	9	13	7	16
Subtotal	81	114	149	
Eng. Technology	51	46	31	
Comp. Science	18	13	16	
Mathematics	19	9	38	
Total	169	182	234	117

Master's degrees

	2004	2000	1990	1980
Engineering	36	40	34	
Mathematics	6	1	2	
Total	42	41	36	7

COSTS

Tuition per credit hour

	2004	2000	1990	1980
Undergraduate resident	\$74.10	\$60.40	39.20	19.50
Graduate resident	\$112.45	\$91.70	58.45	30.75

Mandatory fees per credit hour

	2004	2000	1990	1980
	\$93.50	66.31	24.10	\$8.40

Tuition & fees per year

	2004	2000	1990	1980
Undergraduate	\$4,802	\$3,358	\$1,936	\$840
Graduate	\$4,522	\$3,245	\$1,981	\$1,174

Residence halls

(Double occupancy/semester)

	2004	2000	1990	1980
	\$951	\$711	\$439	\$304

Food service (per semester)

	2005	2000	1990	1980
Minimum	\$737	636	\$422	\$263
Maximum	\$1,328	866	\$732	\$378

Average student debt load

	2004	2000	1990
	\$18,333	\$14,222	\$8,987

Average financial aid award

	2004	2000	1990
	\$7,053	\$4,894	\$3,194

UNIVERSITY FACULTY

Rank	2004	2000	1990	1980
Instructor	68 13.7%	61 13%	59 14%	40 12.7%
Asst. prof	125 25.2%	121 26%	153 33%	73 23.2%
Asst. prof	122 24.6%	122 26%	89 19%	102 32.4%
Professor	181 36.5%	165 35%	157 34%	100 31.7%
Total	496	469	461	315

Salary

	2004	2000	1990	1980
Instructor	\$39,134	\$38,145	\$25,762	\$15,021
Asst. prof	\$49,296	\$44,006	\$30,951	\$17,258
Asst. prof	\$54,933	\$52,291	\$35,410	\$20,059
Professor	\$64,308	\$62,956	\$42,665	\$24,370

Student-faculty ratio

	2005	2000	1990	1980
	18.7	15.4	18.6	21.1

PHYSICAL PRESENCE

Academic buildings

	2004	2000	1990	1980
Gross area in sq. ft.	1,870,034	1,785,159	1,580,393	1,406,257
Initial cost	\$53.76m	\$48.23m	\$29m	\$25m
Replacement value	\$219.4m	\$189.6m	\$130.7m	\$89m

Revenue buildings

(dorms, Student Union and other facilities where income is received)

	2004	2000	1990	1980
Gross area in sq. ft.	869,860	789,279	693,120	609,105
Initial cost	\$25.66m	\$21.18m	\$13m	\$13m
Replacement value	\$89.8m	\$73.5m	\$52.7m	\$37m

Total buildings

of blds/sq ft maintained

	2005	2000	1990	1980*
	152/2,714,221	150/2,586,584	109/2,631,486	397/2,735,856

* Figure includes Cooperative Extension and Animal research facilities away from campus. Sources on university data: South Dakota Board of Regents Public Higher Education Facts Books; 1991 Evaluating South Dakota Public Higher Education, 1991 Accountability Report, Board of Regents.

Incubator or industrial park?

When companies' need for space exceeds the Institute's offerings, Entrepreneurs can turn to the Ron Reed Economic Development Center, which is overseen by the Brookings Area Economic Development Center.

That facility, now in its seventeenth year, got off the ground thanks to the work of the late Dean Ernest Buckley.

The Sixth Street center provides affordable rental space, clerical and office support, assistance in gaining financing,

and a wide array of managerial and technological consultants that tap into the expertise available on campus.

The next step could be the Brookings business park, near the Swiftel Center, where twenty acres are available.

Manufacturing interests may be drawn to Telkamp Industrial Park, where Daktronics is located. There are forty acres of city-owned land available there, according to Matt Kurtenbach, president of the economic development corporation.

Creating the physical and corporate structures necessary for economic development has made Al Kurtenbach smile.

"I think there's a change taking place in South Dakota," the board chairman says. "People are thinking more positive with a can-do attitude. We don't have to look to somebody else to come here and do it for us.

"We can, in fact, improve our own state of life and generate jobs to employ our young people."

Dave Graves



Scientists settle in at
GIS Center
of
Excellence

“The work to be done in establishing the Center as a leader in the field of geographic sciences is something I find most exciting.” – Matt Hansen

SDSU and the EROS Data Center have been productive partners in research and academia since the early 1970s. Cementing the relationship even further is a joint research collaboration: the Geographic Information Science Center of Excellence (GIScCE).

Approved by the Board of Regents in May 2004, the Center is unique in that it incorporates the combined educational and research strengths of SDSU and the National Center for Earth Resources Observation and Science (EROS), the largest civilian archive of satellite imagery in the world.

The Center’s goal is to achieve a level of professional recognition that establishes eastern South Dakota as the world’s leading center for all activities related to geographic information science, specifically the science of remote sensing. This emphasis fits well with a number of SDSU/EROS collaborations currently housed in the College of Engineering.

“There are just a handful of people around the world with the ability to study global change the way we will be able to,” says Hansen, co-director of the Center. “Our agenda is quite ambitious. Our group will be a

“Our agenda is quite ambitious. Our group will be a global competitor in our field, there’s no question about it.” – Matt Hansen, co-director of the Geographic Information Science Center of Excellence.

global competitor in our field, there’s no question about it.”

Collaborative research

The Center, headquartered on the SDSU campus in Wecota Hall, has Tom Loveland, senior scientist at EROS Data Center, as the other co-director.

Hansen and Loveland will coordinate and collaborate with University department heads and supervise the scientists, activities, and programming of the Center.

Six senior scientists each from EROS Data Center and SDSU will work on the development of research proposals and projects, training students and additional scientists, and providing leadership for the Center.

Officially called senior scientist research professors, they also will have commitments to teaching and scholarship. Each will hold academic rank in their appropriate area with instructional teaching responsibility.

The intention is for the Center to perform world-class investigative research on the changing earth, while providing an on-going pool of trained scientists and scholars needed to grow the programs at EROS. In addition, South Dakota students will have an opportunity to obtain a professional education to compete with the best counterparts in the world.

Looking at the Earth

The Center’s inaugural year will be spent on planning and initiating research projects at the global, national, and local levels.

Hansen points out that big picture studies of the earth’s surface have greatly benefited understanding global systems, including climate, biogeochemical cycles, natural resources, and habitats.

“We would like to have one signature piece and that would be to map global change using Landsat data,” he says. “Engineering plays a role in how we handle and process such huge data sets.”

“In this era of the global marketplace and rapid development, monitoring disturbances of the earth surface will help us

understand current changes and model future impacts on the earth system. This is important work, and the Center affords a great platform for pursuing studies of this magnitude.”

Monitoring the land surface and all its variations through time and space has important local benefits. With the dominant land surface in South Dakota being agriculture, the Center has applied for a NASA EPSCOR grant to conduct crop monitoring.

“Enhanced crop monitoring has obvious benefits to the economic well-being of the state,” notes Hansen. “Think of how much of the land surface was recently inundated due to rain and whether farmers had to use crop insurance to cover their losses.

“One of the sensors I use for global mapping is MODIS,” he adds. “It takes a picture of the earth’s surface every day, and for crop applications, daily observations allow for improved crop development monitoring.”

Since Hansen’s specialty area is global scale studies of land cover mapping through satellite imagery, he speaks highly of the Center’s large-scale agenda.

“The work to be done in establishing the Center as a leader in the field of geographic sciences is something I find most exciting,” he says. “The substantial resources committed to this effort at SDSU, in addition to those committed by EROS, represent a unique opportunity for innovative and meaningful study of the earth system. In both professional and personal terms, this is a thrilling opportunity for me.”

Kyle Johnson

Photo left:

Matt Hansen, co-director of the Geographic Information Science Center of Excellence at SDSU, visits with U.S. Representative Stephanie Herseth following a July press conference at the EROS Data Center. The GIS Center incorporates the educational and research strengths of SDSU and EROS, which is the largest civilian archive of satellite imagery in the world.

Matt Hansen began his duties as co-director of the Geographic Information Science Center of Excellence October 18, 2004. Prior to SDSU, he was a researcher at the University of Maryland developing methods for satellite-based mapping of global land cover and land use change. He is a pioneer researcher in mapping land cover at continental and global scales. Hansen and Tom Loveland, the other co-director of the Center, spent most of the spring and early summer recruiting scientists for SDSU and from EROS to constitute the Center’s research team.

The scientists from SDSU are:

- **Mark Cochran**, an ecologist with expertise in tropical fire ecology and in the dynamics of fire and land use change in the Brazilian Amazon.
- **Geoff Henebry**, an environmental scientist whose research focuses on developing theory and technique to improve the analysis of image time series and the modeling of ecological phenomena.
- **David Roy**, a remote sensing scientist with expertise in algorithm development for mapping land cover phenomena and in assessing the quality of scientific products derived from remotely sensed data sets.
- **Mike Wimberly**, an ecologist with a specialty in geospatial modeling of the environment, incorporating interdisciplinary expertise and data sources.
- **Chunsun Zhang** has a degree in photogrammetry and specializes in developing automated methods of extracting information from satellite images.

The scientists from EROS are:

- **Kwabena Asante**, a hydrologist specializing in continental scale hydrologic processes with a regional focus on Africa.
- **Kevin Gallo**, a climatologist who studies the interaction of land cover and land use change and climate variability.
- **Shuguang Liu**, a forest ecologist specializing in biogeochemical and hydrological modeling.
- **Gabriel Senay**, an ag engineer with expertise in large area modeling of vegetation water balance.
- **Jim Vogelmann**, a botanist with expertise in vegetation health monitoring using remotely sensed data sets.
- **Zhiliang Zhu**, a forester with expertise in large area mapping, monitoring, and fire dynamics.

When Hansen was hired, he referred to his appointment as, “My highest professional achievement to date.” According to the Carmel, Indiana, native, bringing top scientific minds together ranks a close second.

“I have really, really talented people on board,” he says. “The hiring process was a big part of my job. They are preeminent researchers who are very good at what they do.”

With the staff in place, Hansen indicates teamwork will be integral to the Center’s success. “The ability to work together is an important asset in addition to being a first-rate scientist,” he says. “The individuals are of sufficient standing that they can set their own agenda. However, we will work off of each other’s strengths and compliment each other.”

Kyle Johnson

Right brain **MEETS** left brain

Engineering collaborates with visual arts for Expo logo design

Engineering and graphic design may seem like they belong on the opposite ends of the academic spectrum. Instead, the two share a similar design process and a strong visual aspect, says Graphic Design Professor Tim Steele.

"Engineering and art probably have a lot more to do with each other than people initially think," he says. "They're trying to make something work, we're trying to make something work."

A collaboration between the two seemed like a perfect way to create a new logo for the Engineering Expo.

For the first time, the 2005 Engineering Expo featured a logo designed by a student.



Paul Bezdicek

Event organizers used previous Engineering Expo logos designed by Virginia Coudron at University Relations for several years. "I thought it would be a great idea if we had an updated logo," says Paul Bezdicek, president of the Joint Engineering Council and chairman of last year's Engineering Expo. His roommate's girlfriend, a graphic design major, was taking a corporate identity class at the time.

Knowledge of the class gave Bezdicek an idea—a collaboration between engineering and graphic design students in the Visual Arts Department.

"I thought it was a good event for both design graphics and the College of Engineering," Bezdicek says. He worked with Steele, who teaches Visual Communications II, a required class for all graphic design majors. The course requires seniors to build portfolios by creating a corporate identity design and use specifications.

In addition to projects dealing with fictitious companies, students can choose the non-profit corporation with which they would like to work, Steele says. This year,

students chose between two non-profits: the Engineering Expo and the Center for Infectious Disease Research and Vaccinology, a collaboration between SDSU and USD. Fourteen of the twenty-five students in the class chose to design an Engineering Expo logo and corporate identity.

To familiarize students with Expo, Bezdicek gave a presentation to the design class in October. "It was a little bit different

"Engineering Expo" overlapping into the bridge's design. The words "South Dakota State University" form the bottom of the logo.

"We wanted something that would obviously get attention," Bezdicek says. "We wanted something bold that was easy to read." Since his design was chosen, Fergen received a bookstore gift certificate from the College of Engineering.



"Graphic designers work to solve communication problems. When students work with clients, it goes beyond the textbook assignment."

— Tim Steele, graphic design professor

speaking to a group of peers, instead of older or younger people," he says. After about two weeks, the Engineering Expo chairmen, Brian Carstensen and Joey Stadheim, decided which designs would go to a full Joint Engineering Council vote.

"The intuitiveness of some of the designs was amazing," Bezdicek says. "It was unbelievable how much time and effort the students put into the project."

In December, the Council chose a design by Kyle Fergen, a senior graphic design major from Brookings. The logo features a suspension bridge with the words

Time and work goes into researching, understanding, and determining the functionality of images, Steele says. "Graphic designers work to solve communication problems. When students work with clients, it goes beyond the textbook assignment."

Steele works as a mentor and a mediator between the class' outside clients and the students. He says he is open to further collaborations in the future. "We had a wonderful and enjoyable time working with Paul Bezdicek and the Engineering Expo," he says.

"Next year, we want to use the logo that came in a close second. It was a great logo," says Bezdicek, a senior mechanical engineering major from Arden Hills, Minnesota. He says he hopes a future collaboration every few years may be a possibility.

Denise Watt

Making a game of it



Writing computer programming becomes as simple as a video game

Juniors Michael Van Bommel, Scott Kool, and Tigh Kistler, one of two teams from Brookings High School, took first place honors with their program "Puzzle++."

"I would say it was a success. The kids are already looking forward to it for next year. That speaks something in itself," says Sue Bertelson, computer programming and algebra teacher at Brookings High.

The judging criteria placed emphasis on creativity and user-ease. Shin says of the winning design, "It was very user-friendly, dynamic, and colorful."

Team member Scott Kool says, "I thought it was challenging to come up with a new way to teach programming, but it was a lot of fun also. We were going to write a basic tutorial, but then thought what would appeal to kids the most. We said, 'a game.'"

Miranda Reiman

COOL PRIZES

High school students participating in the Program Design Challenge competed for more than the honor of best design. Held on campus April 22, the contest featured some impressive prizes.

A team from Brookings High School won first, earning:

- A digital camera for each team member;
- \$2,000 two-year renewable scholarships to the Electrical Engineering and Computer Science Department;
- Choice of Microsoft or Adobe software for the school.

The second-place team from Mitchell High School won:

- A graphing calculator for each team member;
- \$1,000 two-year renewable scholarships;
- Choice of Microsoft or Adobe software for the school.

Marshall (Minnesota) High School's third-place team received:

- A memory stick for each team member;
- \$500 two-year renewable scholarships;
- Choice of Microsoft or Adobe software for the school.

Champions of the inaugural Computer Programming Design Challenge is this Brookings High School entry. Pictured, from left, are BHS computer programming teacher Sue Bertelson, team members Tigh Kistler, Scott Kool, and Michael Van Bommel; and Dennis Helder, head of the Department of Electrical Engineering and Computer Science. The Brookings juniors created the program "Puzzle++."

Beyond the number crunching and hardware technicalities, there is a part of computer program design that is often overlooked: creativity.

Ten high school teams competed in the first ever Computer Design Challenge, which tested that creative ability. Held on campus April 22, the event coincided with the Engineering Expo.

Teams, consisting of up to three students and a coach, had eight weeks to design tutorial software to teach others the basics of computer programming, and one Brookings High School team moved well outside their box in their creative thinking. The students made thirty-minute presentations of their designs to a panel of judges.

Five judges—one SDSU student, one faculty, and three industry representatives—heard the first round of presentations. Four teams were asked to present again in the afternoon round, when ten judges selected the overall champion.

"I was impressed by the creativity and the originality of the designs. The techniques we can teach, but creativity is more difficult," says Sung Shin, computer science professor, who along with Assistant Professor Charlie Shim, was a driving force behind the contest. The idea was to give students more freedom than

"It's a win-win situation. These kids get a chance to experience what software design is about and it gets us connected to the high school. It highlights the talent that's out there in the state and region."

— Dennis Helder, department head

typical computer contests, which are strictly problem-solving in the form of lengthy tests.

"They're only limited by their own ability. The Program Design Challenge gives them a realistic view of what the profession is about," says Dennis Helder, head of the Department of Electrical Engineering and Computer Science. "It lets these kids get immersed in computer science for a longer period of time."

That is the goal behind the challenge.

"It's a win-win situation. These kids get a chance to experience what software design is about and it gets us connected to the high school. It highlights the talent that's out there in the state and region," says Helder.

Senior design

links students, sponsors



How would Stephen Briggs view senior design projects had they been available to him nearly a century ago?

Even though Briggs had the ultimate invention as a college student, a six-cylinder, two-cycle automobile engine, and later teaming with Harold Stratton to form the Briggs & Stratton Company and become the world's largest manufacturer of air-cooled gasoline engines, the 1907 graduate would no doubt be pleased and maybe envious, too.

That's because senior design is the College's definitive hands-on learning instrument in preparing seniors for the workforce.

Student teams must complete the projects during their last two semesters. The aim is to apply their coursework to practical engineering problem solutions in a realistic team environment.

The process can be grueling, and since senior design is required of all seniors in engineering, the experience can signal if they are ready for the world.

"Senior design is a one year, capstone design experience that is intended to give students a real-world team design experience," says Dean Lewis Brown. "It's a difficult year and the motivation and drive they need isn't going to be there unless it's in the engineering area they really want to pursue.

"It has all those pressures of timelines, budget, and scheduling that go into the dynamics of team management," he adds. "All of those are real-world challenges of product design and development."

Student teams are composed of the different engineering disciplines, from electrical, mechanical, civil and environmental, agriculture and biosystems, manufacturing engineering technology, to electronics engineering technology.

A good exposure tool

Students showcase their projects twice a year at the Senior Design Conference in November and the Engineering Expo in April.

Many projects are sponsored by local and regional companies. Some support faculty research, while others are the result of "brainstorming discussions" with students and a faculty member, who serves as the technical advisor.

Adams Thermal Systems of Canton contacted the College a year ago seeking student help to improve the efficiency of a machine used to braze joints on heat exchangers for oil coolers.

After logging about 2,000 hours on the project, five students presented their brazing machine design at the 2005 Engineering Expo.

"We went through and designed a better machine to do the same process," says team member Rod Hageman. "It's a prototype so we haven't presented it to them yet. There is still more design work to be done, but the experience has been very rewarding."

Neal Paul, a senior product engineer at Adams Thermal Systems and a 1994 mechanical engineering graduate, indicates the venture is a win-win situation.

"Senior design is a great way to stay close to the College and it gives us exposure to the students," he says. "Students work on real-world problems with a budget to take their design to a physical, prototype level. It's a low-cost way for us to get help on design and manufacturing issues that need to be resolved, but are not high priority items."

Projects lead to savings

Twin City Fan and Blower Company of Brookings has sponsored five senior design projects since 1999. At this year's Expo, four students had a project to

improve the cutting of fan blades to size using various methods.

The project was presented to company managers and corporate executives. The students estimated it would cost \$150,000 for a vertical machining center, but they projected savings of \$100,000 per year and a payback period less than two years.

"We're grateful to this group of students who have shown us a more productive way to manufacture fans," says Steve Eliason, a manufacturing engineer and a 1990 agricultural engineering graduate.

During the last six years Twin City Fan has incorporated four senior design projects into the daily operation of the company.

"We're very impressed and satisfied how the students work together to achieve their goal," adds Eliason. "Twin City Fan is more efficient because of their help. We feel the students benefit from working on real-world projects."

Leads to employment

Farmers hope to benefit from an automated irrigation system that four students from agricultural and biosystems engineering presented at the 2004 Expo.

Called 'pivot sense' and sponsored by AgSense of Huron, the system uses radio technology and global positioning system sensors to automatically start and stop the irrigation system based on crop needs and soil moisture.

Farmers currently view data and control the irrigation pivots from the Internet. With 'pivot sense,' farmers are taken to the next level, where they only have to monitor the process.

"We're testing it this summer," says team member Jared Oswald. "Once it's operating, it will be a matter of convincing farmers to let go and let the device do the work. Once they see what's

Senior Design



happening, I think they will gain confidence in it.”

Oswald is a graduate student using ‘pivot sense’ for his thesis. His work translated into full-time employment at AgSense, whose owner, Mel Wieting, cites senior design as a big plus.

“It’s a huge advantage for us,” he says. “The students are very bright, but the professors get very involved and that’s also a big help. We’ve been able to establish a good relationship with the Ag and Biosystems Engineering Department.”

Says Oswald, “It’s awesome to be on the forefront, but I want to spur more research, because someone else may come along with a better idea and that’s fine. There have been attempts and nothing has caught on yet. It will be interesting to see what happens.”

Important in interviews

According to Chad Gloege, a supervisor and hardware design engineer at Daktronics,

senior design comes in handy when interviewing job applicants.

“When we interview candidates, we always ask about their senior design project,” says Gloege, a 1998 electrical engineering graduate. “Sometimes it gives you a good feel for their level of technical expertise, areas of interest, and leadership potential. You can also get a feel for how determined and creative they are at finding solutions to the many problems that will inevitably arise.”

Erich Grebel worked for Daktronics as a student and was hired as a hardware design engineer after earning a degree in electrical engineering in May.

“Senior design provides a person with tremendous knowledge, and even if your project isn’t directly related to what you will be doing, it’s great to have on your resume,” Grebel says. “The process is a real-world experience where you take your book knowledge and put it to practical use.”

Kyle Johnson

Photos left to right:

Fanning a new design – From left, Kyle Prouty, Matt Larson, Scott Christianson, and Brett Huber display their handwork for a project that improves the process and fixture used to cut fan blades to size at the 2005 Engineering Expo.

A brazin’ solution – The redesign of an automatic brazing machine that brazes manifolds to tube joints simultaneously on mechanically assembled steel tube/aluminum fin heat exchangers was the senior design task for, from left, Brady Hokenson, Rod Hageman, Todd Letcher, Steve Menning, and Jason Heinemann.

A welding fix – Assistant Professor Carrie Steinlicht, left middle, listens as SDSU students Austin Stewart, Trent Stodhiem, Tyler Schroeder, and Craig O’Hearn discuss their Feterl Welding Fixture at the Engineering Expo April 22. The project involved designing and building a manufacturing welding fixture to improve safety, production time, and maximize cost efficiency in the production of curbside utility boxes.

SENIOR DESIGN PROJECTS

Senior design projects

In the 2004-05 academic year, a total of thirty-seven senior design projects were undertaken in seven departments. The number in parentheses reflects the projects done in that department.

Agricultural & Biosystems Engineering (3)

Confinement Building Monitor and Control

(Mylo Hellickson, advisor)
AgSense, Huron (sponsor)
Ryan Lefers, Ben Wipf, Sara Smith, Justin Whitehead

The design and development of an automatic system for maintaining optimum ventilation and environmental conditions in swine confinement facilities.

Post Pounder – Magazine Option

(Mylo Hellickson, advisor)
Bobcat (sponsor)

Lindsey Bernau, Ivan Daub, Matt Becker, David Mensing
Design, construct, and test a magazine to store and automatically provide properly oriented steel and wood posts to a post pounder that is attached to a Bobcat Skid Steer loader.

Post Pounder Pounding Unit

(Mylo Hellickson, advisor)
Bobcat (sponsor)
Nick Michael, Brent Bast, Nathan Stewart, Mike Stermoch
Design, construct, and test a post pounder that attaches to a Bobcat Skid Steer loader that accepts both steel and wood posts from a compatible post storage magazine.

Civil & Environmental Engineering (5)
Sioux Falls S.E. Vocational School I-29
Pedestrian Bridge
(Arden Sigl, Nadim Wehbe, advisors)

HDR Engineering (sponsor)
Matt Erpenbach, Drew Millard, Hura Ngega, Sara Schneider, Brian VanderWaerd
Task is to design a bridge that will provide safe crossing for pedestrian traffic over I-29 near South East Vocational School in Sioux Falls.

Ree Creek Replacement Structure

(John Schemmel, advisor)
South Dakota Department of Transportation (sponsor)
Carrie Buthe, Curtis Smith, Lance Weatherly
Project includes the complete design of a replacement structure for an existing bridge three-quarters of a mile north of Miller on Highway 45.

Brookings Street Project

(Charles Tiltrum, advisor)
Banner & Associates (sponsor)

SENIOR DESIGN PROJECTS

Chris Cressy, Chris Jibben, Jeff LeMire, Kathy McMahon, Mark Wellner, Jon Wiegand
Plans for the reconstruction of 34th Avenue, which is one-half mile east of I-29, connecting 6th Street and the Highway 14 bypass. The development will meet the needs for future commercial and industrial growth.

National Avenue Project

(Ali Selim, advisor)
Ryan Schmitz, Ben Nelson, Simon Schmitz, Mike Heiberger
Construction plans for an extension of National Avenue in Sioux Falls, including storm sewer, street design, sanitary sewer, and water main.

Opportunity Aggregate Resource Study

(Allen Jones, advisor)
Becky Schwab, Morgan Gagliano, Dane Jorgensen, Jared Haskins
The project analyzes the possibility of developing a sixty-acre pasture on the opportunity farm south of Lennox as an aggregate mine.

Electrical Engineering (8)

Autonomous Youth ATV

(Robert Fourney, Rick Haub advisors)
Adam Ormesher, Chris Wurtz
Utilizing GPS technology and electrical motors, a complete guidance system was developed to test ATVs (popular vehicle in the power sports market) to alleviate safety concerns.

Bidirectional AC/DC Converter

(Steve Hietpas, Mike Ropp, advisors)
Dan McMahon, Jay Tolle, Jared Clark
The design of a bidirectional AC/DC power converter to allow power flow from the DC outputs of solar panels and the asynchronous AC outputs of wind turbines into a national power grid.

DC Fan Controller with Diagnostics and Communications

(Mike Ropp, advisor)
Daktronics (sponsor)
Erich Grebel, Jesse Walter
A microprocessor based speed controller for brushless DC fans. Fan speed can be controlled based on internal temperature, which reduces the noise produced during normal operations.

Photoelectric Timing Device

(Mike Ropp, advisor)
Daktronics (sponsor)
Brian Bigge, Ahmed Halaweish, Jordan Williams

A timing device design that functions at long distances, resists interference from external light sources, and operates on separate channels.

LED Based Sun Photometer

(David Aaron, advisor)
Physics Department (sponsor)
Jason Filipek, Vince Scholten
The design of a sun photometer that collects irradiance data by using LED technology. The use of LED's instead of filters greatly reduces the price of the sun photometer and allows for an expanded network across South Dakota.

Smart Block Heater

(Robert Fourney, Rick Haub advisors)
Justin Thiner, Jason Clausen
A smart block heater design that can be programmed to learn the owner's schedule. The heater will turn on a few hours before hand so it's ready when the owner needs it, thus saving electricity.

Amazing Floating Pencil

(Steve Hietpas, Rick Haub, advisors)
Justin Dewald, Dan Honomichl
As a way to attract students at events like Junior Day and Senior Day, a recruiting tool was devised with an electronic/magnetic device capable of levitating a pencil in the air.

Medication Reminder Bottle Cap

(Lewis Brown, Rick Haub, advisors)
Adam Fenski, Samantha Meendering
Plans for a medication bottle cap that will utilize a user-programmable clock and timing system to remind patients to take prescription medications. The cap is an electronic device that will replace the cap on commonly used prescription bottles.

Electrical Engineering & Computer Science (1)

Gyroscope Test System

(David Galipeau, advisor)
Naval Undersea Warfare Center Division, Keyport, Washington (sponsor)
Brian Heidemann, Kevin Wheeler, Jeff Kranz
The division is working to integrate micro-electromechanical (MEMS) gyroscopes as guidance devices in torpedoes that would replace existing spinning gyroscopes. Project aims to develop an interface between the MEMS gyroscope and PC and also simulate a data stream similar to the MEMS device.

Electronics Engineering Technology (6)

ProTour Switcher Design

(Byron Garry, advisor)
Daktronics (sponsor)
Keith Griebel, Greg Rademacher, Mark Watkins, Joel Schaub
Manage the development of a ProTour™ switcher control and configuration/diagnostic panel by Daktronics with project costing \$43,200.
Daktronics Display for Addison, Texas

(Byron Garry, advisor)
Daktronics (sponsor)
Eric Grenz
The contract supervision to provide a Galaxy display system and manage the subcontractor hired to manufacture and install the structure and install the Daktronics displays at a sales price of \$59,950.

Flight Computer Project

(Dennis Helder, advisor)
Brian Ludens
A proposal for upgrading or developing new flight computer hardware and software for data acquisition and navigation of aircraft. The system aims to be user friendly to help reduce the work load on the pilot.

The Electronic Line Follower Robot

(Dave Mathews, advisor)
Rick Hansen
The design of a robot that follows a black line on a white surface. It involves three integrated chips along with seven infrared sensors.

Solberg Security System A

(Dave Mathews, Mark Sternhagen, advisors)
Dustin Price, Rob Tagtow, Alex Hegerfeld, Joel Schaub, Corey Peterson
The development of a wired security system composed of cameras, computers, and software for Solberg Hall, including a door sensing alarm.

Solberg Security System B

(Mark Sternhagen, advisor)
Adam Howard, John Bloom, Will Schneider, Eric Neuarth
Security layout plans for Solberg Hall, which will feature a wireless system of cameras, keypad door locks, monitors, taping equipment, and authorization cards.

Manufacturing Engineering Technology (5)

Concrete Company Business Plan

(Byron Garry, advisor)
American Custom Concrete (sponsor)
Chuck Rossol

Develop a business plan for a custom concrete product at a cost of \$60,000. Format to include information on industry conditions, product description, marketing research, operation plans, time line, risks, exit strategy, and financial plan.

Feterl Manufacturing Weld Fixture

(Jerry Visser, advisor)
Feterl Manufacturing, Salem (sponsor)
Austin Stewart, Trent Stadheim, Tyler Schroeder, Craig O'Hearn
Design and build of a manufacturing welding fixture designed to improve safety, production time, and maximize cost efficiency in the production of curbside utility boxes.

GPRPC Time & Cost Estimation Device

(Jerry Visser, advisor)
Great Plains Rapid Prototyping Consortium (sponsor)
Katrina Lentz
A project to develop an online method of time and cost estimation for the Great Plains Rapid Prototyping Consortium based on past projects, computer generated estimates, and operator experience. A tool was devised that will estimate future project lengths.

Implementation of 5S

(Teresa Hall, Al Mousel, advisors)
Engineering Shops (sponsor)
Eric Bergquist, Eric LaFleur, Christopher Wilde
The team applied 5S techniques (sort, simplify, sweep, standardize, self discipline) to a machine tool area in the engineering shops.

Prest Rack Process Efficiency

(Jerry Visser, advisor)
Prest Rack (sponsor)
Matt Coplan, Ryan Joens, Chris Harrington, Chris Swier
Project's goal is to identify and resolve efficiency areas to increase productivity at Prest Rack, focusing mainly on the welding process.

Mechanical Engineering (8) Redesign of Brazing Machine

(Don Froehlich, advisor)
Adams Thermal Systems, Canton (sponsor)
Rod Hageman, Jason Heinemann, Brady Hokenson, Todd Letcher, Steve Menning
The redesign of an automatic brazing machine in a manufacturing facility to braze manifolds to tube joints simultaneously on mechanically assembled steel tube/aluminum fin heat exchangers.

Redesign of Fan Blade Machining Process

(Don Froehlich, advisor)
Twin City Fan and Blower Company, Minneapolis (sponsor)
Matt Larson, Brett Huber, Kyle Prouty, Scott Christianson
The project involves improving the process and fixture used to cut fan blades to size.

Flail Mower Redesign

(Don Froehlich, advisor)
Tiger Mower (sponsor)
Raymond Munk, Jonathan Deppe, Josh Pommer, Tyler Nielsen, David Healy.
A redesign of the hydraulic drive and general aesthetics of Tiger's side mount flail head mower.

Structural Adhesive Application System

(Don Froehlich, advisor)
Daktronics (sponsor)
Joe Bannwarth, Josh Gillette, Jessica Weber, Mike Hulscher, Shannon Mutschelknaus
A plan for a structural adhesive application system that will be used at Daktronics. It involves the placement of front and back sheets on message displays.

Skid Loader Cooling System Revision

(Don Froehlich, advisor)
Gehl (sponsor)
Ben Taecker, Greg VanHecke, Reid Hamann, Brett Casanova, Eric Hansen

Project's goal is the redesign of the cooling system on a Gehl skid loader. Goals include better efficiency, lower noise output, and better overall design.

Barrel Cutter for Star Circuits

(Don Froehlich, advisor)
Star Circuits (sponsor)
Todd Barnes, Matt Levorson, Chris Degen, Matt Fiegen
Project involves using a sawing device to cut spent fifty-five plastic barrels down to size to reduce storage costs and shipping costs so more barrels can be sent in one truck load.

Windshield Frost Prevention

(Don Froehlich, advisor)
Clearview Enterprises, Elkton (sponsor)
Cameron Welbig, Jess Freesemann, Kurt Keszler
Project focuses on prevention of frost on car windshields with a device that could run on a rechargeable DC-power source capable of maintaining enough energy to keep frost from ever forming on a windshield.

Deadace Hauler

(Don Froehlich, advisor)
Bobcat (sponsor)
Andrew Nelson, Luan Phan, Joseph Spee, Robert Voss
A project to design a new Bobcat attachment, which will allow a single user to drive up to another Bobcat machine and move it safely, efficiently, and conveniently to another location. Process currently involves two workers each using a forklift.

Human Powered Vehicle

(Don Froehlich)
Spoke-n-Sport of Sioux Falls (sponsor)
Matt Jaquet, Kevin Meier, Ryan Carda
Project aims to design and develop an innovative and effective human-powered vehicle capable of safely attaining high speeds for long distances.

WEBSITE CREATED FOR JOINT ENGINEERING COUNCIL

The Joint Engineering Council, chartered more than thirty years ago with a mission of promoting science and engineering, launched its own website this spring.

Users can go to <http://studentorgs.sdstate.org/jec> or type "JEC" into the main search bar on the SDSU homepage. Following the links from the SDSU site will lead users to the external site of the JEC.

The website serves as a great way to keep up on events, follow general happenings within the College for all organizations, and make contact with officers and advisors in organizations of interest to you.

The site was designed by student Kayla Flynn, who serves as webmaster.



What a summer job

Senior awarded exclusive internship at NASA

Joe Schenkel truly believes “You can go anywhere from here,” even Mars.

The SDSU senior and Air Force Reserve Officer Training Corps (AFROTC) cadet has high-flying dreams of reaching the stars as a military pilot and an astronaut. The prestigious eight-week internship he received from the NASA Engineering Research Experience program just may be the first step on his mission to Mars.

The program selected ten AFROTC cadets for four-week internships, and only two for eight-week internships.

Schenkel, an electrical engineering student and Tyndall native, learned of the internship through Capt. Carlos Merino, SDSU AFROTC commandant of cadets, and Lt. Col. Craig Bond, SDSU professor of aerospace studies.

“Cadet Joe Schenkel is one of our top cadets,” Bond says. “We knew he would compete well for the program in Houston

“Eventually, I want to pursue a master’s degree in aeronautical engineering to increase my chances of becoming a pilot or engineer astronaut for NASA.”

— Joe Schenkel

this summer, so it was no surprise that out of 144 AFROTC detachments competing, Mr. Schenkel was one of the top two selectees.”

No doubt, Schenkel’s outstanding achievements secured his position.

In addition to holding a 4.0 GPA in his core engineering classes, Schenkel, a former physics student of the year, finished fifth out

of more than 300 cadets in his field-training unit, receiving a Distinguished Graduate honor. He also conducted research in nanotechnology at SDSU during a summer research program, which was funded by the South Dakota Space Grant Consortium.

Schenkel’s internship activities at the Johnson Space Center will add even more impressive credentials to his resume.

Rocket of the future

“The two cadets selected for the eight-week internship will be working with Dr. Chang-Diaz on the Variable Specific Impulse Magnetoplasma Rocket (VASIMR),” Schenkel says. “Dr. Chang-Diaz is very respected in the scientific community, and he has been in space seven times, which is more than any other person.”

For twenty-five years, Chang-Diaz has been working on the rocket, which could significantly reduce travel time to Mars.

“With all of the advancements in the space program that will happen in the next 20 years, I think I have a very realistic chance of achieving my goal.”

— Joe Schenkel, on flying in outer space

“The VASIMR is expected to be the rocket that gets us to Mars,” Schenkel says. “It really is the rocket of the future. Since I am majoring in electrical engineering, I will probably be working with electronics or magnetic fields during the internship.”

Lewis Brown, College dean, knows the internship will provide Schenkel with a valuable educational experience.

“This will be a unique opportunity for Joe to participate in science and engineering in one of the world’s finest research facilities,” Brown says. “As a senior electrical engineering major who will soon graduate, this is an opportunity for him to see how professionals in his discipline work with experts from many other areas to address some of the most difficult scientific challenges.”

Preparing to pilot

Schenkel was at Johnson Space Center June 5-August 5, but the benefits of this experience will last much longer and provide a launch pad for his career aspirations.

This cadet colonel, the highest AFROTC rank, will soon enter pilot training. “I received a pilot slot earlier this semester,” Schenkel said. “I will be going to pilot training after graduation from SDSU in May 2006. I plan on being a career military pilot.”

With pilot training next summer and a Johnson Space Center internship this summer, Schenkel’s career flight plan is definitely on course.

Ending up in outer space?

“Receiving this internship and my pilot slot really are the first steps in achieving my long term goals,” Schenkel said. “Eventually, I want to pursue a master’s degree in astronautical engineering to increase my chances of becoming a pilot or engineer astronaut for NASA.

“It is my goal to make it into space either flying the spacecraft or as a support engineer,” he said. “With all of the advancements in the space program that will happen in the next 20 years, I think I

have a very realistic chance of achieving my goal.”

For someone with goals like Schenkel’s, an internship working on a rocket bound for Mars could be just the boost he needs.

“This internship means the world to me,” he said. “It will introduce me to what astronauts do day-to-day, and I will be able to make some great contacts.

“Because I want to become an astronaut myself, and it is one of the most competitive career fields in the world, this internship could play a huge role in my future. I am grateful beyond words.”

Nicole Schaffer

THE SCHENKEL SCRIPT

- A native of Tyndall, Joe Schenkel spent the summer conducting research at Johnson Space Center in Houston.
- He already has reached the stars academically, earning a 4.0 in his core engineering classes.
- As an Air Force cadet, Schenkel fifth out of more than 300 cadets in his fielding-training unit.
- Schenkel, who will graduate in May 2006, already has an Air Force pilot slot but wants to fly even higher.

STUDENT NEWS

ME student earns pair of scholarships

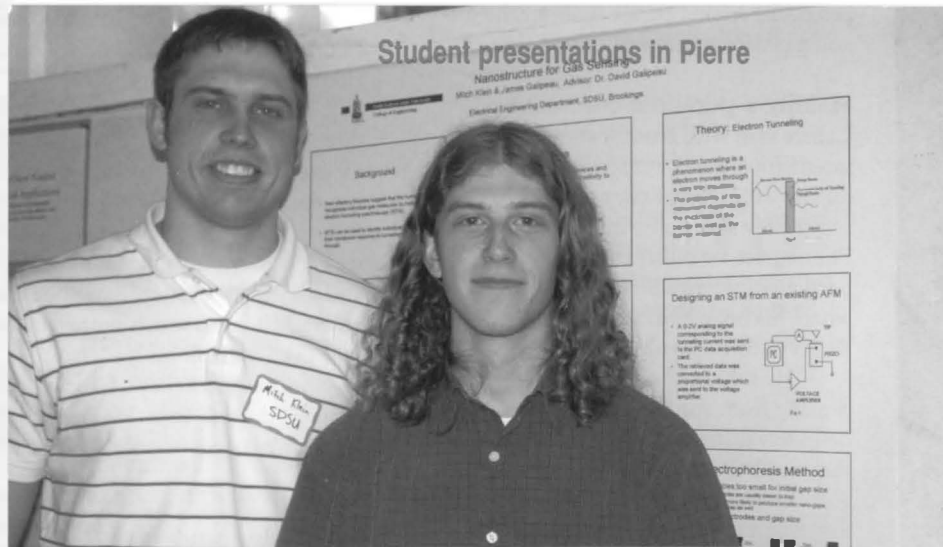
Brad Van Berkel, of Sioux Center, Iowa, was the only SDSU student to earn a \$2,000 scholarship from the American Society of Mechanical Engineers Auxiliary this spring and on July 28 was awarded a \$5,000 scholarship as a result of his internship work with Pella Corporation.

The mechanical engineering scholarship is a national award given to ASME student-members based on participation in the society, character, scholastic achievement and need.

The Pella scholarship was based on accomplishments during his internship, demonstrated leadership, and a personal interview. The firm had forty-nine interns and he was among six chosen for the award

Van Berkel is a senior mechanical engineering student and has served two years vice president for the SDSU student chapter of the ASME

Fereidoon Delfanian, advisor for the club, wrote Van Berkel’s letter of recommendation for the mechanical engineering award.



Mitch Klein, left, a senior electrical engineering student, and James Galipeau, a junior electrical engineering student, traveled to Pierre in February for the Student Research Poster Session. Hundreds of college students gathered to explain to legislators the importance of the grants that funded their research. Galipeau and Klein’s project dealt with different aspects of a novel gas sensor. “One of the legislators said that I did a good job of breaking the research down to a non-technical audience,” Galipeau reports.

■ Students

For junior agricultural engineering major Jay Kelley, the College of Engineering Phonathon goes far beyond dialing for dollars.

"Phonathon is more than just fundraising for the College of Engineering," he says. "In my eyes, we're calling to maintain relationships. The money will come later."

Now a third-year Phonathon veteran, Kelley has served as co-chairman for two years. "We had a really good team," he says of the 2005 volunteers. "Our donors were very supportive this year."

So supportive that the 2005 Phonathon total of \$153,945 broke the previous all-time record of \$152,035 set in 2002.

"It was just phenomenal," Kelley says of the event, held January 29 to February 5.

He credits those on the receiving end of those phone calls. "The whole thing's not possible without our donors," says Kelley, who points to facilities, computers, and recent building remodeling as other assets in making the Phonathon successful.

Donors choose where they would like funds to go, whether to the Greater State Fund or the College of Engineering specifically, he says.

"The Phonathon gifts support those very important activities of the College of Engineering that are not provided funding by the state," says Dean Lewis Brown. "It is difficult to conceive how our academic programs could operate without the on-going generous support of our alums."

Making a personal connection

Callers visit with alumni about job leads, internships, and ways students can prepare for the workforce, Kelley says.

Kelley says that while he had heard of Phonathon, he didn't think about participating until he took a co-op position where his boss, a SDSU alum, suggested Kelley become involved.

"He told me how much he enjoyed hearing from students," he recalls. "He definitely wanted to let students know what they needed to do."

"Our alumni particularly enjoy talking to students and recalling their own fond memories of SDSU," Brown says. "As an alumnus of the Electrical Engineering program, I have been enjoying the annual Phonathon phone calls for nearly twenty years."



Putting fun in fundraising

Phonathon celebrates record-breaking year

"Before my family and I returned to South Dakota, it was a great way to find out who was still teaching in the program, how the Jackrabbits were doing in sports, etc. For the sake of this personal contact, we have resisted hiring professional callers and remain steadfast in using our own students to call alumni."

'So much more' than fundraising

As a sophomore, Kelley attended his first Phonathon meeting and he volunteered to chair the training committee.

Phonathon recruiting efforts are directed towards underclassmen, Kelley says. He credits publicity, including a new brochure, with getting students involved. "They [students] knew what Phonathon was, but they only knew it as calling donors and asking for money," says the Brookings native. "[It is] so much more than that."

Even with all his leadership responsibilities, Kelley's favorite part remains the talk time. Phone conversations lasting forty-five minutes are not unusual, he says.

Rewarding students

Kelley estimates that nearly 100 students took part in this year's Phonathon, from serving on committees to making phone calls.

"A lot of teachers give extra credit" or an assignment to obtain certain information from a donor, Kelley says.

Food serves as another reward. In the past, students ate pizza and other "college junk food," Kelley says. This year, the mechanical engineering group worked with Hy-Vee and others to provide meals for participants.

"We had a really good menu," featuring food from places like Pizza Ranch, Hy-Vee, KFC, and Z'Kota Grille, Kelley says. "We got a lot of compliments on that. We only had pizza twice."

Organizers look to students for ideas on prizes and foods to offer, he says. Students working more than one shift receive movie tickets. Prize drawings during every shift offer chances to win everything from sweatshirts to Brookings Bucks, which became a new offering this year as well.

"I never looked at [prizes] as an incentive," Kelley says. "I always looked at it as a thank-you."

Denise Watt

Jay Kelley, Phonathon chairman, explains the computerized phone system at the SDSU Foundation to Brad Gregory, a mechanical engineering sophomore from Glenwood, Iowa, on February 3. That was the day after the 2005 Phonathon topped the record set in 2002. The new fundraising record is \$153,945.



Former storage room gets extreme makeover

Students at SDSU are getting more technological experience in their education, thanks to an extreme makeover in the Agricultural Engineering building.

Known simply as "127A," a former storage room-turned classroom emerged this spring from a major transformation, from floor to ceiling. One of the most subtle, but important, changes was wiring the classroom for complete Internet access and adding twelve Gateway computer workstations.

Other cosmetic changes include new floor and ceiling tiles, lights, furniture and countertops and storage drawers. Since the major renovations to the 1958 classroom were completed during the past year, the classroom has become home to engineering, ag and biosystems engineering, and computer science students.

Van Kelley, department head of Agricultural and Biosystems Engineering, says the classroom was put together in pieces, adding a little bit here and there throughout the past year.

Dean Lew Brown told Kelley, "You and your folks are to be commended for the new AE 127 computer lab. It shows how a great idea can become a reality with teamwork, including the fundraising. I hope the students realize when they walk

in the lab, that it was in part due to their annual Phonathon efforts that ABE now has a wonderful facility."

All of the funding came from external sources. "We are very grateful to our friends and alumni for making the renovations possible," Kelley said.

Courses taught in the new room include instrumentation, climatology, several mechanical engineering offerings, and other computer-based classes. Students said they would start spending even more time in the classroom—as many as twelve hours per week—as they worked on end-of-the-year projects.

"Giving the students total access to this classroom will be a definite benefit to them," says Dick Nicolai, a farm machinery and safety specialist who served as coordinator of the renovation project, which was formally opened in March.

"There is a technological need from companies and our students will be able to satisfy those needs with classes utilizing this classroom. The students will have modern equipment and will therefore be better equipped to move into their chosen industry," he says.

Nicolai says the area will not only serve as a classroom, it also will be a place for students to work on their own.

"They can use the room for a lot of

different things," he said. "They can work on their reports, do drawing and testing and even use it as a resource room. Several of the engineering students are working on their senior design projects."

An overhead computer projector was added, allowing students to see information displayed on the instructors' computer.

"Many of our faculty use simulation projects," Nicolai says. "Now they can work with students and use different techniques that they weren't able to use before."

The finishing touches will eventually include new paint and curtains, but, for the most part, the classroom has been transformed.

"This is a wonderful thing," Nicolai concludes. "The classroom will allow everybody to work with greater ease and better technological accommodations."

Greta Stewart

Van Kelley, head of the Department of Agricultural and Biosystems Engineering, explains the features of a new computer lab to those gathered at a March 22 ribbon cutting in the Ag Engineering building. The former store room now has twelve Gateway computer workstations, all with complete Internet access.



Shin

fast-forwards
career via
IBM
internship

Joining the Speed Team, computer science major Jennifer Shin is experiencing deadline pressure firsthand as part of her IBM internship with the company's Speed Team program. Her selection is an honor reserved to fewer than 5 percent of interns and co-ops that come to Big Blue's Rochester facility.

For many people, accessing information from computers has become a part of daily life. Part of that access involves servers, or computers that perform specific functions. Tasks like checking e-mail, accessing websites, and hosting instant message chats all involve servers.

But behind the continuous maze of networks and servers lie technologies that make this access possible. And behind these technologies are people like Jennifer Shin.

Shin, a junior computer science major and daughter of Computer Science Professor Sung Shin, is spending her summer working with some of these technologies as part of a deadline-driven IBM internship. This isn't her first experience working for IBM. Last June, she began a six-month co-op position at the Rochester, Minnesota, location. The former biology and pre-dentistry major says the experience solidified her decision to switch to computer science.

"I've learned to like computer science," says Shin, who will graduate in May 2006. "I like it because after an assignment I've been given, I have a tangible product."

This summer, however, Shin is working for IBM's Speed Team program. Speed Team internships challenge groups of students to work together for twelve weeks to develop "new ideas, markets or technologies" for the company, according to IBM's website.

Shin's selection to a Speed Team is an honor reserved to fewer than 5 percent of interns and co-ops that come into Rochester, says Becky Schmieding, Shin's IBM mentor and a 1978 SDSU graduate.

Gaining a 'broader perspective'

Once accepted into the Speed Team program, Shin interviewed with a few managers to determine her team placement. She and her team of four other students are working with middleware, a type of IBM software used to create complex applications on computing servers.

Lotus Domino and WebSphere Application Server are two types of middleware products, says Schmieding.

"Lotus Domino provides the familiar personal productivity functions such as e-mail, contact lists, calendar management, and task lists," she says. "[It] also supports advanced features that enable teams to share information and collaborate on projects.

"WebSphere Application Server provides the technologies necessary to create complex web-based Internet applications," she adds. "Next time you fill out a loan

application or buy a product using the Internet, you might be using a website that is powered by WebSphere technologies.”

“It’s something I’m looking forward to doing,” says Shin, who hopes this summer’s internship will give her a broader perspective, helping her decide if she wants to pursue a career in industry or continue schooling after graduation.

Focusing on teamwork

While Shin’s previous internship focused on individual testing of software products, her Speed Team internship focuses on teamwork and solving problems.

“We want them to get a specific thing accomplished and finished,” says Schmieding, who has worked at IBM for twenty-seven years since earning degrees in both math and commercial economics. She now recruits students from her alma mater to work for the company.

Speed Teams center on a targeted goal rather than the routine software testing that

was the focus of Jennifer’s other internship, she says. IBM seeks both former interns and co-ops to work on Speed Teams because adjusting to life at the company alone usually takes anywhere from six to eight weeks, Schmieding adds.

Shin agrees. “It’s like a whole different world there,” she says, adding that IBM even has its own language. “Everything has an abbreviation. That took a while to get used to.”

The 3.6 million square-foot Rochester facility employs between 4,000 and 5,000 people, Schmieding says.

‘A great drive and energy’

Shin’s project this summer will focus on JAVA, a type of computer language. While she spent some extra time refining her JAVA skills before the internship, she says her SDSU education has helped her overcome the learning curve at IBM. “I think I have a better appreciation for school now,” she says.

She adds that last year’s co-op job gave her “more focus.” According to IBM’s employment website, co-ops and interns are similar. While interns usually work during the summer, co-ops often work for six to seven months. Co-ops participate in a cooperative education program at their colleges or universities as well.

Comparing and contrasting the educational programs of her fellow team members serves as another advantage to the Speed Team program, she says.

Schmieding says Shin “made a good impression on the management team here.”

“She’s a very good people person. She’s got a great drive and energy. She’s an outgoing person, which also helps,” she says.

Through career fairs, Schmieding says IBM Rochester has hired about six co-ops from SDSU per year. “I feel that the students we recruit have good potential to impress the management team here,” she says.

Denise Watt

ASCE student chapter

Civil engineers continue success Tiltrum retiring from teaching, not advising of ASCE chapter

Chuck Tiltrum may be known as a tough professor, but he has a soft spot for students.

In May, Tiltrum completed his twenty-fourth year as advisor of student chapter of the American Society of Civil Engineers. Under his direction, the club has been named top in its zone or nation for seven consecutive years, this year earning the Vice President’s Award for Zone III. That means the club is the best chapter in the zone—one of four across the country.

“A lot of our success is due to Chuck and what he has done for us,” says Nicole Tomaszewski, a junior civil engineering student. “He’s been in it for the long haul. He really enjoys what he’s doing.”

The club focuses on community service, professional development, and networking.

“From what I’ve seen with other student chapters . . . we’re a lot more involved,” says Tomaszewski, who was last year’s community service coordinator. “We really stress community service,” she says.

The chapter helps with blood drives, facilitates elementary engineering outreach programs, and calls for the College’s Phonathon. The club usually has

weekly activities and business meetings twice a month, which feature speakers from the industry. “It’s helped to expose me to what’s out there,” says Tomaszewski.

At nearly eighty members, it’s one of the largest student organizations on campus.

“Chuck has been key to getting so much involvement. He leads by example. He’s very involved in our Department,” says Tomaszewski.

Although he retired this spring, Tiltrum will stay on as advisor for another year.

“I’m happy that they’ve asked me to come back,” Tiltrum says.

Miranda Reiman

Help from across the border

SDSU students won three out of five scholarships sponsored by a Nebraska engineering society.

Brian Burke, David Jahraus, and Robert Milbrandt each won scholarships of varying amounts given by the Nebraska Senior Section of the American Society of Mechanical Engineers.

The scholarships are just one of

several ways that the senior section supports the students. “The Nebraska senior section of ASME has been very good to us and have helped in many occasions providing tours of industries, scholarships, and speakers,” says Fereidoon Delfanian, advisor to the student chapter.

The money given to the SDSU club encourages the students to compete at the

regional conferences. Past projects, like the liter-bottle-filling device or “Rock Retriever” remote control climbing device, have advanced to national competitions.

“Our students feel good that they can compete. Once they get involved in these activities, they don’t want to let go,” says Delfanian.

Miranda Reiman



Lacher's leaving

Green Thumb of Math Department ending 35-year career

"He fully expected some of us to actually better understand his subject material than even he did. At first that seemed absurd to me. After all, he was the professor with a doctorate! However, he reminded us that unless some students were able to learn and apply material even better than their teachers, our world was destined to know less and less with each generation." — Lew Brown, recalling the words of his former professor

Summing up thirty-five years of teaching probabilities and statistics at SDSU, Robert J. "Bob" Lacher says, "It's been a good ride."

With that simple statement, the affable number cruncher told a retirement reception gathering that he was leaving the Department in good hands. Those hands include MIT-educated Department Head Kurt Cogswell and Dean Lewis Brown, a former student of Lacher's.

In fact, Brown still recalls the 6:30 a.m. stat class he took from Lacher and has kept the textbook.

In describing the retiring professor, Brown called Lacher "fun, personally caring, honest, rigorous, and humorous."

Delving a bit deeper, Brown reveals that "the most enduring thing he left me was the very frank and honest way that he shared to us how he fully expected some of us to actually better understand his subject material than even he did.

"At first that seemed absurd to me. After all, he was the professor with a doctorate!

"However, he reminded us that unless some students were able to learn and apply material even better than their teachers, our world was destined to know less and less with each generation.

"I have never forgotten this candid assessment of teaching and learning and I still think it is quite a profound lesson."

Lacher's April 20 reception in Crothers Engineering Hall also drew SDSU President Peggy Miller, who remembers that the first time she met Lacher was when she was in Brookings in 1997 to interview for the job and was attending church.

The message was given by Lacher, who has been a lay minister with the Episcopal Church since his undergraduate days. With a willing heart, a self-taught theological education, and the support of his local priest, Lacher was certified as a lay minister in 1958.

In addition to sporadic fill-in preaching at area churches, Lacher serves at least once a month at the Episcopal Church in De Smet.

Growing two careers

His career at SDSU began in 1970, when he completed a two-year teaching assistantship at the University of Northern Colorado in Greeley.

The Lachers were looking for a small midwestern town with an all-purpose

university. So when Lacher had a chance to interview with Department Head Ernie Richards for an open position at SDSU, he jumped at it.

Lacher found Brookings to not only be a place for fertile academic development, but also a fertile place for his non-academic passion. Since 1974, he has been the owner and operator of Lacher's Vegetable Farm and Market at his twenty-acre home on the west edge of Brookings.

Customers drive to the market to capture the harvest from Lachers' seven-acre garden.

Attracted to college students

In the classroom, Lacher enjoyed the "excellent" students at SDSU. "There are strong family values and a solid work ethic. I'd been in New Jersey, Minnesota, and Colorado before I got here. A lot of my students were first-generation college when I got here.

"College was an exceptionally big deal. Students were more interested. They were a little more wide-eyed, in some ways naïve, not expecting anything to be given them. They expected to earn it."

The St. Cloud, Minnesota, native began teaching math in 1961, the year he graduated from St. Cloud State. He taught at Litchfield (Minnesota) High School for three years, earned his master's degree at Rutgers University, and in 1965 moved back to St. Cloud, where he taught at the university for three years.

His time spent teaching at St. Cloud made him realize that he liked the higher subject levels and student maturity associated with college teaching.

"I thought I was going to go back to high school teaching when I was getting my master's degree."

Making a lasting impact

With that in mind, Lacher headed to UNC to pursue his doctorate, which was officially granted in 1971. For the last two-thirds of his SDSU career, Lacher mainly taught graduate courses.

As he steps away from the Department, he sees achievements that are extending beyond his tenure.

"I wanted to have some programmatic things that will survive my leaving. Our master's program now regularly has twenty students. At first, there was one or two.

Three was a big crowd. It is very satisfying to see that grow," Lacher says.

In his leadership of the Department's graduate program, Lacher "pretty quickly ended up advising all the graduate students." He also made presentations to the math faculties at small liberal arts colleges and sent out a newsletter for several years.

"We were not looking for Noble Prize winners, but we were looking for students who these teachers thought were graduate material." The graduate program was purposefully built on the tenet of promising individual student attention, Lacher says.

His efforts paid off as the master's degree program gradually grew and has been at twenty students for the last few years, he says.

The Department's future

Beginning this fall, SDSU will offer a doctorate in computational science and statistics engineering, which will be a joint program with the University of South Dakota.

Lew Brown, dean of engineering at SDSU, said between SDSU and USD about five faculty researchers were hired.

"Computational science and statistics is the development and implementation of sophisticated math and statistical models into computer software for scientific applications. In our case, those applications will primarily be in the biology sciences.

"These will be people who develop models to study living systems, whether it's populations of some species or interactions of molecules, and they want to use the models on very high performance computers.

"They will study and predict what happens in living systems," Brown explains.

For Lacher, who turned 66 on July 5, retirement won't truly sink in until fall. This summer, he is again teaching that 6:30 a.m. statistics class. When fall classes begin and Lacher stays home, he will be thinking about a future student.

The first grandchild for Bob and Jean Lacher is to be born December 10.

Dave Graves

THE LACHER FILE

Hometown: St. Cloud, Minnesota

Education: St. Cloud State, 1961; master's in math, Rutgers University, 1965; doctorate in math, University of Northern Colorado, 1971.

Military: Corporal in the U.S. Army, 1957-61.
Career: SDSU, 1970-2005; Northern Colorado, 1968-70; St. Cloud State, 1965-68; Litchfield (Minnesota) High School, 1961-64.

Areas of academic interest: Statistics, Topology, Quality and Process Control
What is a topologist? A mathematician that combines analysis and geometry.

Family: Wife - Jean, married in 1966.

Two daughters - Jennifer Starace, teaches high school English and journalism in Maine; Stephanie Lacher, teaches high school math in Vermont.

Outside the classroom: Lay minister for Episcopal Church; operates a seven-acre vegetable garden business at his home.



Photo above

A young Bob Lacher reviews problems with Tim Wittig and an unidentified student in an early 1970s photo taken while the Math Department still had its offices in what was then called HEN House (Home Economics/Nursing). Wittig '76 taught math at SDSU from 1997 until his death in 2003.

Photo left

Bob Lacher addresses the gathering at his April 20 retirement reception in Crothers Engineering Hall. The math professor began his SDSU career in 1970. Pictured at right is Department Head Kurt Cogswell, who made one of the retirement presentations.



Chuck Tiltrum

Tiltrum staking out
new territory —
retirement

Civil engineering
associate professor
to continue
as ASCE advisor

Surveying his career, Chuck Tiltrum never expected to be in the business of teaching his engineering trade.

"I'm not an educator. I'm a civil engineer/surveyor who teaches," says Tiltrum, who retired after twenty-four years as an associate professor in the Civil and Environmental Engineering Department.

Before returning to his alma matter, Tiltrum worked in the engineering department for the city of Sioux Falls from 1974 to 1981.

"I think I was able to use my real world knowledge in course work," he says. Tiltrum, who received his undergrad in 1972 and his master's in 1974, taught classes like elementary surveying, land surveying, and municipal engineering. Electives are "the fun classes to teach," says Tiltrum, who has enjoyed working with the motivated students.

More than once he has received "The Order of the Royal Shaft," due to his high expectations. The traveling award, which is given by the students, honors the "toughest" professor in the College. "I don't think

they're going to retire it in my name or anything," he jokes.

"I'll miss teaching the technical electives," he says, of the classes that "put the pieces together."

During his tenure at State, Tiltrum's true passion has been advising the student chapter of the American Society of Civil Engineers.

"It's been a very positive. We're working with the professionally motivated students," says Tiltrum, who was hired, in part, to advise the group. Dwayne Rollag, department head at the time, "must have known something I didn't know. It's been a good match," he says.

Among his bragging points is the chapter's continual success on both the regional and national scene. In 1999 and 2004, the chapter was selected as the best student chapter in the nation. "It's exciting to know our students have won the respect of the nation. The big item is community service activities," says Tiltrum.

Some of the club's many activities include building sheds for Habitat for Humanity, the College Phonathon, helping at the Engineering Expo, and painting a local railroad bridge and a day-care center a couple of years ago. This year the club received the 2005 Vice President's Award for Zone III (its region).

"The students have done a great job. I really enjoy it. I think the students have benefited from it," says Tiltrum. He will continue in the advisor role for the coming school year. "I'm happy that they asked me to come back," he says.

Tiltrum's wife of thirty-five years has been understanding of the out-of-class time he puts into the ASCE student chapter. At his retirement party, Tiltrum also credited his wife with grading his multiple choice and fill-in-the-blank exams for the past twenty-four years.

"She's been very supportive. She enjoys meeting the students and working with the students," he says. "Thanks to my wife, and the support of the staff, we've been able to travel," says Tiltrum, who has taken the club to national conferences in places like Baltimore, St. Louis, Boston, and San Diego.

Although Tiltrum is retiring, he is still planning on working. "I've had my own surveying business since 1984," he says, noting that he's going to partner with Wayne Haug, another retiring faculty member. "We've both been extremely busy," says

Retirees

Tiltrum, who also came back to teach the summer surveying courses.

His top surveying project, however, will be keeping better tabs on his five grandchildren, who live in Sun Prairie, Wisconsin, and Las Vegas, Nevada.

Miranda Reiman

THE TILTRUM FILE

Hometown: Alcester

Education: Attended SDSU, 1963-65, 70-74, receiving a bachelor's degree in civil engineering in 1972 and a masters degree in 1974

Military: Sergeant in the U.S. Air Force 1966-70

Family: Wife, Karon, married in 1966.

Son, Michael '90 civil engineering; now pilot in the U.S. Air Force National Guard; wife, Shana '91, holds a bachelor's in music education

Daughter, Michelle Bayer '95, English education; coached Jackrabbit softball from 1995 to 2001; now directs a program for high school students who want to be teachers in Las Vegas, Nevada; husband, Steve '92, is a graduate of the Journalism Department.

Miscellaneous: First executive director of the South Dakota Society of Professional Land Surveyors in 1994; ASCE student chapter advisor of the year three times; Named "Engineer of the Year" by the Northeast Chapter of the South Dakota Engineering Society; Three-year District 16 National Director for the ASCE; served ten years on the Aurora City Council, including one year as mayor.



Professor Arden Sigl, left, and Chuck Tiltrum enjoy a good laugh at Tiltrum's retirement ceremony April 27. Sigl presented Tiltrum with his retirement pin. He also received a surveyor's field book with the names of current students.

Photo left:

Associate Professor Chuck Tiltrum helps Tanessa Wescogame spot a target to site in with a self-leveling tripod level at a Flandreau Indian School Success Academy workshop in April 2001. The photo appeared on the cover of *Impulse* that summer.

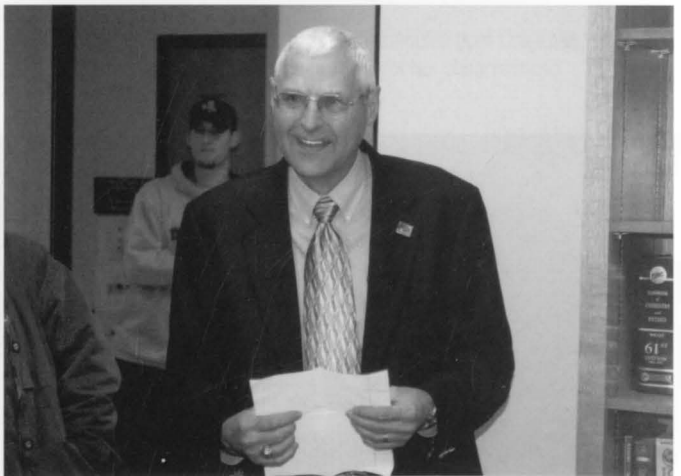
Math Professor Ken Yocom leaves SDSU with a framed print of the Campanile, a few other gifts, and a million memories. He began work at SDSU in 1962 after earning his master's degree at the University of Wyoming. He earned his bachelor's degree at South Dakota School of Mines, where he was called on to help Duane Sander, the former SDSU dean, with math problems. Yocom was honored at an April 26 ceremony.



Three of the four College of Engineering faculty members who retired this spring were together for the April 26 retirement reception for Ken Yocom, far right. Yocom, a math professor, retired after forty-three years. He served as department head from 1980 until July 2004, when he was featured in the Summer 2004 edition of *Impulse*. Joining Yocom are Chuck Tiltrum, left, and Bob Lacher, center. Not pictured is Wayne Haug.



Wayne Haug, an assistant professor in construction management, smiles while listening to a crack from the peanut gallery at his April 29 retirement reception in Solberg Hall. He served in the department since August 1997. In his retirement, Haug will do surveying work with fellow retiree Chuck Tiltrum, who retired from the Civil and Environmental Engineering Department this spring.





NASA impressed by local second- graders

Dalsted presents Hillcrest
students with regional award

Some hidden treasures can't be found in dusty old chests or stored in glass display cases. One SDSU treasure is SDSU's Oak Lake Field Station. Nestled in the rolling prairie hills by the shores of Oak Lake twenty-two miles northeast of Brookings, the field station doubles as an outdoor classroom and research facility for students both young and old.

During the past school year the station served as an outdoor lab for some award-winning young scientists.

Mary Husman's second-grade class at Brookings Hillcrest Elementary School won first place in their region in NASA's Student Involvement Program, My Planet, Earth. Chosen from a pool of 2,860 students, the class of twenty-two studied the prairie and its ecosystems.

My Planet, Earth challenges kindergarten through fourth-graders to work in teams or as a class to observe the environment around them. Students collect data and make connections to learn about their surroundings. At the end of the project, the teacher assembles a written overview, along with resources, student pictures and drawings, and other materials, into a competition packet.

Husman's class began work on the prairie project in September. The idea came from Sue Young, whose daughter Katy belonged to Husman's class.

"We thought we had this great resource with Oak Lake," says Young, whose husband Alan, an associate vet science professor, discovered the project while surfing on the Web.

Students measured wind speeds and used microscopes to look at water samples, Young says. "The kids learned so much about a prairie ecosystem," says Young, whose family moved to South Dakota from Boston. "I learned a lot, too, actually. The Oak Lake people were just really wonderful."

For Husman, who says she wasn't aware that NASA had activities for those in primary grades, the project became a perfect solution.

"I was looking for something like this," says the teacher, who describes her students as "very capable. We have a very bright



“I learned a lot, too, actually. The Oak Lake people were just really wonderful.”

— Sue Young, parent of a second-grade participant

community. We have more resources than I think you have anywhere.”

Husman divided the class into four teams to study different things: air, life, land, and water. “All of them had different things to look at, to compare,” she says.

Before the students went out into the field, they did research. The Game, Fish and Parks Department delivered educational materials, including bones and pelts to the students, she says. The children read books as well.

Once in the field, students used notebooks to record their findings. Specific questions guided their research. “They knew specifically what they were looking for,” Husman says. The project encompassed other classroom subjects as well. The students read Little House on the Prairie books and made measuring sticks to measure grass height and erosion.

A teacher for more than thirty years, Husman says she found it challenging to bring some of the project material to the students’ level. “It’s not as rewarding if you just give them the answers,” she says.

“We saw a giant telescope. It was huge,” says 7-year-old Patrick Stein. He says the students saw a great blue heron and two bald eagles. The students observed tracks about eight feet apart, which means the animal “had to be moving really, really fast,” he says.

Husman says she didn’t expect the class to win. She received the letter in April. “It didn’t say NASA on it anywhere,” says Husman. When she announced the award to the class, they were shouting. “I had to close the door,” she says. “I think that it’s nice when you are rewarded for something. This will be something they will always remember.”

Kevin Dalsted, associate director of the South Dakota Space Grant Consortium, a NASA program, presented medals to the students at a May 18 ceremony.

Nels Troelstrup, director of the Oak Lake Field Station, says the facility offers schools a microscope loaning program, opportunities for field courses or trips, and environmental education for teachers to become re-certified.

Although Hillcrest Elementary has used the field station before, My Planet, Earth was the first project of its kind, Troelstrup says.

One of his graduate students, Jill Rust of Estelline, showed the students around the field station, including both the prairie and forested areas. She told students about the ecology of a wetland area and helped them do field work similar to her own.

“I think the second-graders had a lot of fun,” says Rust, adding that the project offered more hands-on activities than other field trips. “I like to work with second-graders. That age group is kind of fun.”

“It’s easy to fire up kids that age,” says Troelstrup. “It was a real positive thing. We’re really glad they had so much success with it.”

Denise Watt

Photo above left:

Kevin Dalsted, associate director of the NASA-funded South Dakota Space Grant Consortium, talks to students in Mary Husman’s second-grade class at Hillcrest Elementary School in Brookings May 18. Representing NASA, Dalsted was on hand to present the class its awards for winning first place in the regional NASA Student Involvement Program. The winning program, selected from a pool of about 2,860 students, was about prairie life.

Photos below left to right:

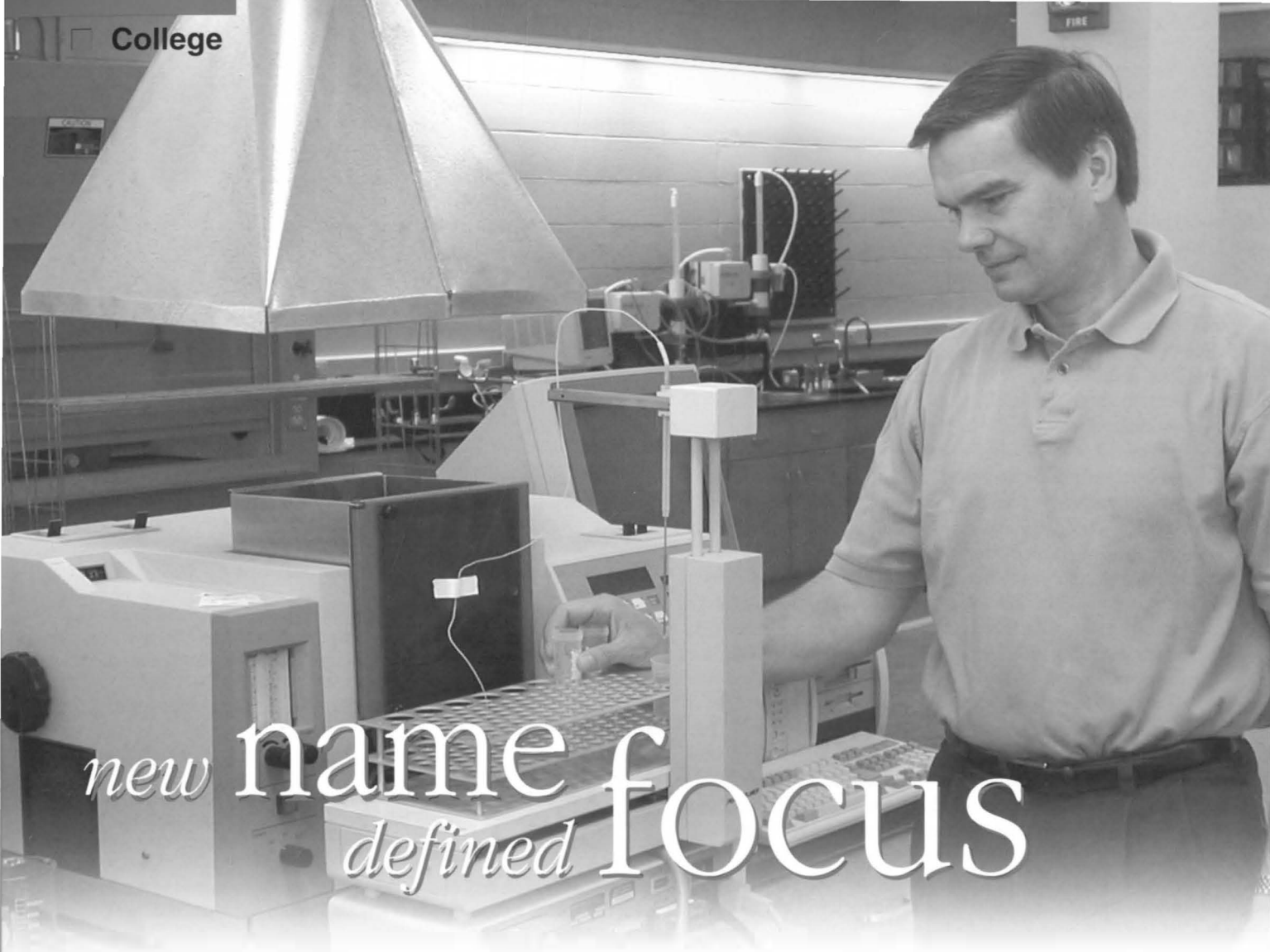
Patrick Stein (front) and Alec Onstad run through the prairie grasslands at Oak Lake Field Station just after measuring the height of the grasses. They were amazed at the height of some of the grass stalks.

Katy Young (with sample net), Wesley Hurley (front), and Carter Mahlum venture to the edge of Oak Lake to scoop out plants or animals. The field station provided the sample nets for the second-grade scientists.

Second-grade teacher Mary Husman carefully takes a picture of a large thatch ant colony in the grasslands area at Oak Lake Field Station northeast of Brookings. Graduate student Jill Rust warned children that these ants can bite.

Hillcrest second-grader Sarah Minier looks at water samples from Oak Lake. She saw microscopic plants and animals, and made drawings of her observations.





new name *defined* focus

Water center seeks greater research, outreach opportunities

Northern Great Plains Water Resources Research Center is no more. In its place stands the Water and Environmental Engineering Research Center. The new name, approved in January, represents a honing of its mission but no change in faces. The center continues to be directed by Delvin DeBoer, a professor in the Department of Civil and Environmental Engineering.

He took the position January 1, 2003, after Vern Schaefer accepted a post at Iowa State.

The fifteen-year-old water research unit plans to seek research supporting economic development in South Dakota and the region and offer problem-solving outreach to municipal, community, and industrial water and wastewater facilities.

That doesn't represent a drastic change from the past practices of the center, but through a series of meetings with major

water users and suppliers there now is a better understanding of the needs, DeBoer says.

He estimates that 25 percent of the center's efforts are basic research. Applied research—solving a particular problem of an entity—forms the remainder of the work.

The original concept

The concept of a water research institute on campus dates back to 1989, when a white paper was developed by a collection of people from the region that had an interest in water resources. The list included people from the School of Mines, the USD School of Law, and state and federal agencies.

Plans for a major institute with a \$300,000 operating budget in an 80,000-square-foot building never developed.

Rather than developing as a roaring river, the center became a constrained creek. It operates with basically two people and for

years was located in the former kitchen at Grove Hall. But the center has brought in \$5.8 million in funded research projects since it began in 1990 under the leadership of Vern Schaefer.

DeBoer, who spends 80 percent of his contract teaching in Civil and Environmental Engineering, directs a staff of six: a secretary and senior laboratory chemist, and four faculty members from the Department of Civil and Environmental Engineering. They conduct research at the center, which is now located in remodeled space in Crothers Hall.

Allen Jones, Chris Schmit, Suzette Burckhard, Francis Ting, and DeBoer are all teaching faculty that do research on the side.

"The center is really nothing without these people because they're the ones that write the [grant] proposals, gain the research dollars, and make the connections," says DeBoer.

He adds that every research project includes at least one graduate student in addition to the faculty member.

The center has contracted with cities and industries as well as the Indian Health Service, the Department of Energy and Natural Resources, the Bureau of Reclamation, the South Dakota Association of Rural Water Systems, and the U.S. Geological Survey.

Five to ten research projects are conducted per year.

'Applying theory to practice'

"We're focusing on problems that are important to the Upper Midwest," DeBoer says. Past projects have included researching the cause of pinhole leaks in the homes of several customers in a municipal water system and helping a municipal water plant improve its ability to remove iron and manganese.

"We do studies, research work, applying theory to practice. We don't do design," DeBoer explains.

Research work often puts the faculty in contact with municipal engineers, who learn more about the center's capabilities. Those include analysis of water samples for total organic content and biological oxygen demand, common tests required of water systems.

The center's laboratory in the recently renovated Crothers Hall is shared with the Civil and Environmental Engineering Department.

The lab also serves as a training location for water plant operators, who come in for a one-day class sponsored by the center, the department, and the South Dakota section of the American Water Works Association.

Last year, the state group was honored by its parent association with a national education award for the program.

Dave Graves

WATER CENTER RESEARCHERS

- **Suzette Burckhard**, who has taught at SDSU since 1997, specializes in waste site mediation, and remote sensing water resources investigations.
- **Delvin DeBoer**, the center director since 2003, has taught at SDSU for twenty-one years in two stints, the last since 1987. He specializes in current water treatment and distribution issues for municipal and industrial clients.
- **Allen Jones**, at SDSU since 2003, is the center's geotech person. He also has experience in waste site remediation, including hazardous waste cleanup and acid mine reclamation.
- **Chris Schmidt**, at SDSU since 1998, is the center's wastewater person. He conducts research in biological nutrient removal, and the aerobic and anaerobic biological processes.
- **Francis Ting**, at SDSU since 1995, does basic research in hydraulics. His work includes the impact of waves on structures, sediment movement in water bodies, and environmental fluid mechanics.

Delvin E. DeBoer, director of the Water and Environmental Engineering Research Center, loads the sample tray of an atomic absorption spectrometer in the center's lab in Crothers Engineering Hall. The equipment is shared with the Department of Civil and Environmental Engineering.

FACULTY NEWS

Madeleine Andrawis, a professor in electrical engineering, received the 2005 District Rotary Centennial Service Award for Professional Excellence. It was presented June 28 in recognition for her long service to the Brookings community.

Kurt Cogswell became the head of Mathematics & Statistics effective July 1. He had been serving as interim department head since July 1, 2004, when Kenneth Yocom stepped down.

Kevin Dalsted, director of the Energy Resource Center, received the Dean's Team Award from the College of Agriculture and Biological Sciences for

his part in working with the SDSU Precision Agriculture Group. The project is an on-going interdisciplinary effort to use remote sensing in agriculture.

Interim Dean Chuck McMullen presented the award at the Ag College's fall welcome-back ceremony. Dalsted serves as the liaison between the College of Engineering faculty and the ag group, which receives funding from NASA, EPSCoR and others.

Mary Jo Benton-Lee, diversity coordinator for the College, was a nominee in the administrative category for the University's Women of Distinction

Awards that were presented March 29. The winner in that category was SDSU President Peggy Gordon Miller.

Assistant Dean **Rich Reid**, a lieutenant colonel in the South Dakota Air National Guard, and Major (retired) **Kim McLaury** CE '87, a professional engineer in Elk Point, have been awarded a bronze star from the U.S. Air Force. Both served in the 407 Air Expeditionary Group Civil Engineering Squadron.

They received the award as a result of meritorious service in a combat theatre during their service in Iraq in April-August 2003.

Distinguished Engineers

The College recognized more than 120 years of engineering experience this April.

An electrical engineer, an engineering physicist and two civil engineers were honored as distinguished alumni at this spring's banquet. The selection of Jerome Gaspar '67, David Christianson '72, Kathryn Walker '81, and Arlo DeKraai '70 brings to 111 the number of engineers to be honored since the award was began in 1977.

Gaspar



Jerome Gaspar had his own shop growing up, which served as a breeding ground for his natural curiosity and analytical thinking.

"My father was sort of a renaissance man. He could fix anything.

I learned a lot from him," says Gaspar.

He carried that knowledge to SDSU, where he began studying electrical engineering in 1963. He credits some of his success to Wayne Knabach, his advisor. "He was more of a friend than an advisor. There was never a time that he didn't have time for you," says Gaspar.

"Engineering was hard," he remembers, though he never thought of doing anything

else. "I was going to become a South Dakota State engineer no matter what." As he studied for his electromagnetic fields and thermodynamics classes, Gaspar often drew encouragement from a Latin word that means: "We will find a way or we'll make one."

And he did.

For more than thirty-seven years, he worked at Rockwell Collins, a communication and aircraft electronics company. "I was drawn because of the quality of the company and the type of work. The work is very attractive," says Gaspar, who enjoyed working on communication for airlines, space shuttles, and the military. "[Rockwell Collins] has a saying that every American voice in space has come back on a Collins radio."

Prior to graduation, Gaspar had completed a summer internship with the company. "I knew after that summer that I would come back," he says.

As a Bridgewater native, the option of settling in a rural area near Cedar Rapids, Iowa, also was appealing. "It's a gem because it's in the Midwest and in a rural area," he says.

Gaspar held many positions within the company, including Rockwell's Avionics' director of business development and senior vice president of engineering technology. "I was blessed with a growing company, an opportunity-rich company," says Gaspar, who retired in November to "learn other things."

Miranda Reiman

Jerome Gaspar

Hometown: Bridgewater

Education: Bachelor's degree in electrical engineering from SDSU in 1967; master's degree in business administration from Iowa State University in 1972.

Career: Held various positions within Rockwell Collins, where he worked for thirty-seven years

Professional involvement: Member of the Industrial Advisory Board of Sandia National Laboratories in Albuquerque, New Mexico, and Iowa State University; Appointed to the National Academies for Aerospace Technologies Board of Science, Technology and Economic Policy; member of the Product Development Institute; member of the Product Development Management Association, which awarded his company the Outstanding Corporate Innovator Award in 2002.

Family: He and his wife, Olimpia, reside in Marion, Iowa, and have a son and a daughter.

Christianson



Typically, people take better care of their own vehicles, than rental ones.

David Christianson helped his engineering firm turn this knowledge into a successful retirement plan for

his company. While serving as the vice president of human resources for Burns & McDonnell Engineering Company, Christianson was responsible for helping the company establish its employee stock ownership program.

DEAN'S CLUB

Contributions made to the Greater State Fund
January 1, 2004 - May 31, 2005

Support from alumni, corporate donors, and friends has come to be essential to institutions of higher education.

Contributions have made possible the development of activities that have won recognition for the SDSU College of Engineering

as one of the nation's leaders in engineering education.

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

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Instead of traditional retirement accounts, employees are given stock in the company that can be cashed in as they retire.

"It's been more successful than anyone thought. Productivity was higher. [The employees] were working for the client as if they owned a part of the company, because they did," he says. "It works very well in a service-type company."

The program had its obstacles, which Christianson helped overcome.

"It posed all sorts of administrative challenges. Not everyone believed in 1985 that it would work," he says.

Throughout his career, Christianson has found himself in many administrative positions. His education in engineering physics may not have directly prepared him for every aspect of his job, but he does draw on it often. His job involves "looking at problems in analytical ways" and "problem-solving skills."

While at State, Christianson was a class officer and was in charge of the Hobo Days parade. "Learning to work with people in those situations is just as important," says the 1972 graduate, who sees the value in an SDSU education.

"When I was in HR, I took an active role in recruiting SDSU graduates. They did an excellent job. They're really bright people and hardworking. There's a really dedicated staff instilling in them an engineering ethic. You can see it in the graduates that come out," he says.

Christianson left Burns & McDonnell in 2004 after twenty-eight years, and now does private consulting.

He sat on the Distinguished Engineer selection committee for several years, and finds the honor "very humbling. I know the types of people who received this in the past."

Miranda Reiman

David Christianson

Education: Bachelor's degree in engineering physics from State in 1972; master's degree in business administration from the University of Missouri in 1976.

Career: Served as a Minuteman Missile combat crew commander in the U.S. Air Forces; spent 28 years at Burns & McDonnell Engineering Company, holding many positions including, vice president of administration; worked as the vice president of operations for a national litigation document management firm.

Professional activities: Founding president of the Heart of America chapter of the ESOP Association; Served on industrial advisory boards to engineering schools in Kansas, Missouri, and SDSU.

Family: He and his wife, Barb, have three grown children and live in Blue Springs, Missouri. Blue and Gold Tradition: Christianson's grandfather, dad, mother-in-law, wife, little sister, and "a bunch of shirt-tale relatives" all attended SDSU.

Walker



From leading construction crews to coaching nearly 10,000 employees, **Kathryn Walker** has worked her way up to her "dream job."

Currently, Walker, a 1981 civil engineering graduate, is the executive vice president of network services for Sprint. A Kansas City Business Journal article dubs her the "highest-ranking woman officer at a telecommunications giant."

When Walker began her career as an engineering student, however, she was told at freshman orientation that only one in seven women graduate.

"As I look backwards, I wish I would have had the life experience and the maturity to turn that into more of an inclusive challenge," she says. Even so, Walker says, "It strengthened my resolve."

Prior to her twenty-year stint with her current employer, Walker worked for Wisconsin Bell for three years, a change from her original plan to work for the U.S. Army Corps of Engineers.

An avid problem-solver and team leader, Walker admits that she always had "the proverbial good skills in math and science." However, she credits her brother Rick Waples, four years her senior, for encouraging her to pursue engineering. "I think he was very influential," she says.

Throughout her two decades at Sprint, Walker has worked in engineering, human resources, and customer care departments. In her current position, she divides her time among meetings, balancing budgets, and mentoring employees. Even though her days now stretch well beyond eight-to-five, she describes herself as blessed.

"When I left school, in a million years I would have never guessed that I would have had this opportunity," she says. "I love this job. I love running a large team and being able to call the plays."

Last fall, Sprint announced a merger with Nextel, a challenge Walker calls "a great opportunity."

"The real challenge comes from merging two cultures, two teams of people who have an incredible amount of pride and expertise in what they do today. All the processes, integrating of systems, networks and applications associated with the merger will be seamless to our customers as long as the first focus is on our employees," she says. "That's what I look forward to the most."

This fall Walker looks forward to returning to Brookings to watch her two alma maters, SDSU and the University of Missouri-Rolla, face off in this year's Hobo Day game.

Denise Watt

CONTINUED ON PAGE 32

DEAN'S CLUB

Vernon L. Baumberger
Richard R. Bell
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Duane A. and Norma M. Benton
Lesley E. and Wade J. Berg
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Charles F. and Mary K. Cecil
Raymond C. Chao
Barton B. and Paula Christensen
Noel L. and Rita D. Christensen

Distinguished Engineers continued

Kathryn Walker

Hometown: Aurora

Education: Civil engineering degree from State in 1981; Master's degree in engineering management in 1992 and a degree in professional engineering in 1999 from University of Missouri-Rolla.

Career: Started at Wisconsin Bell; worked for U.S. Telecom, which later became Sprint. Appointed executive vice president of network services of Sprint in 2003.

Professional activities: Serves on the dean's advisory councils at SDSU and the University of Missouri-Rolla; active board member of the Sprint Foundation.

Family: Lives with husband, Mark, and three Brittany spaniels in Olathe, Kansas.

DeKraai



A desire to build, hard work, and a few "accidents" along the way, have lead Arlo DeKraai to create sixteen companies in his lifetime.

"The technical engineering degree . . . is a great asset to have

in running a company from the standpoint of looking at things analytically and problem-solving.

I value the asset much more than if I had gotten a business degree or an MBA," says DeKraai, who is currently part-owner and chief executive officer of Cust-O-Fab Companies. The business is a holding

company for several companies "all related to the downstream [refining] side of the oil industry," he says.

Although all of his work has been related to the oil industry, DeKraai says that he fell into that work by accident.

"It wasn't that I was planning to go to Texas and work for an oil company. Texaco was interviewing [on campus] and I didn't have a job," says DeKraai, who graduated from State in 1970. He was hired after a second interview and worked out of Amarillo, Texas, for three years. "I was very fortunate to get that opportunity, and then be in the right place at the right time."

The next job he took was for Refractory Construction in Tulsa, Oklahoma.

In 1979, his love of building turned into building companies.

"I have started sixteen different companies. Some were a success and some of them weren't. It was never a question of taking a risk . . . it was something that came natural or relatively easy," says DeKraai, who was originally going to go to school to be a lawyer.

"[Studying engineering] was another accident," he says, noting that he decided after he had signed up for pre-law to change his major. "I liked working outside," says DeKraai, explaining his choice of major.

He predicted his future in his freshman engineering class. "They asked all of us what we wanted to do with our degree. I remember saying that I wanted to own a construction company."

The year 1994 marked the establishment of yet another construction

company that DeKraai has owned. "We're not done building our company and I don't think we ever will be," he says of his current venture, Cust-O-Fab Companies. There are a number of specialty companies that are all housed within Cust-O-Fab Companies, which provides all of the accounting and administrative support. Each company deals with what DeKraai knows best: the oil industry.

With seven different operating divisions, the company works in more than thirty states and ten foreign countries.

"I hope I'm never done building. If I lose that drive then I might retire," says DeKraai, who is careful to note, "we don't have retirement in our vocabulary." Married to his high school sweetheart, DeKraai continues to reside with his family in Tulsa.

Miranda Reiman

Arlo DeKraai

Hometown: Brookings

Education: Bachelor's degree in civil engineering in 1970

Career: Worked as a civil engineer for Texaco for three years; Spent six years with Refractory Construction: In 1979, started his own company: Construction & Turnaround Services; From then on he has started and sold several different companies in the refining industry; currently is the part-owner and chief executive officer of The Cust-O-Fab Companies.

Family He and his high school sweetheart, Barbara, live in Tulsa, Oklahoma. Their family includes two married daughters and seven grandchildren.

DEAN'S CLUB

- Helmer D. Christenson
- Gregg A. Christiansen
- David E. and Barbara A. Christianson
- Civil Design Inc.
- Robert M. Clark
- Jeffrey T. and Lisa A. Clauson
- Curtis J. and Julie I. Clemen
- William J. and Janet M. Clemen
- Climate Systems, Inc.
- Richard A. and Eleanor J. Coddington
- John C. Cole
- James J. Corothers
- Jerry L. and Nancy J. Cotton

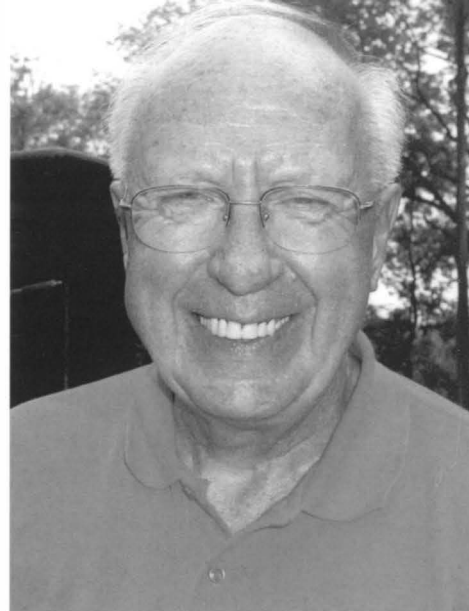
- Leon D. Crossman
- Arthur L. and Florence C. Dahms
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- Robert G. De Raad
- Dean A. De Sart
- Darrell W. and Ruth DeBoer
- J. Tate Profilet and Mary J. DeJong

- Arlo B. and Barbara DeKraai
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Roderick Anderson

Forty-one years of giving back



“Each person has a duty to give to charity. SDSU is pretty much on the top of my list.”

— Roderick Anderson

Roderick Anderson '57 holds degrees in electrical engineering and law, a fairly unique combination in itself.

But what the Sisseton native's framed degrees don't reflect is his generosity.

“Each person has a duty to give to charity. SDSU is pretty much on the top of my list,” says Anderson, of Princeton, New Jersey, who worked with Bell Laboratories and associated AT&T companies for thirty-eight years before retiring in 1997. He has been a faithful contributor the College's Electrical Engineering Department for forty-one years.

“I've always felt indebted to the university for giving me a first-class education; one that worked very well for me,” he says.

Anderson found himself at Bell Laboratories after spending a year at the United States Patent Office in Washington, D.C. His original plan was to become an electrical engineer, and later thought he would be an Air Force pilot, but poor eyesight kept him out of the military.

“I did better than most engineering students in writing and humanity-related courses. I had a feeling if I could combine that with engineering, it would be good. That's why I applied for the patent office [job]. With being a patent attorney, there was a lot of writing to be done,” Anderson says.

Beginning at Bell

While working as a patent examiner trainee in D.C., he met a patent attorney from Bell Labs in Murray Hill, New Jersey.

Soon, Anderson was there as well. “I was worried when I went to Bell Labs . . . [but] I found my education worked very well, thank you. We had people there from MIT, Cal Tech, the Ivy League schools. When I joined Bell Labs, there were a thousand PhDs.

“Me, with my little ole BSEE, I felt rather insignificant. But I was able to comprehend and did quite well.”

So well, in fact, that when Anderson retired, he was senior attorney in intellectual property licensing for AT&T. Anderson combined his climb up the corporate ladder with an attitude of service. “I tried to give back whenever I could, both in the profession and in the community.”

He was president of the New Jersey Patent Law Association in the 1970s and served five years on its council. In 1972-73, Anderson was the mayor of Berkeley Heights, New Jersey, then a city of 14,000 on the western edge of the New York metropolitan area.

His legal training was gained through Seton Hall Law School, where he went nights while working in the Bell Lab law department. “I got into a program they [Bell] had that turned Double Es into attorneys.” By 1961, he had his law degree.

Lessons not forgotten

While his East Coast career kept him from being an active alumnus, he says he never forgot his background.

The former student of the late Junis Storry says that when he first came to Bell Labs, he relied on the lessons gained from

Storry's electrodynamics. Anderson also recalls tucking away useful information from classes taught by William Gamble.

That technical base served him well when inventors brought in such devices as lasers, transistors, and optical fiber. “It was a very interesting time to be in telecommunications.”

Even in retirement, Anderson is using skills gained at State.

He plays tennis, which he did recreationally at SDSU, and the former SDSU band member now is a jazz band performer, continuing to play the clarinet and saxophone.

Dave Graves

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Alumni/New Faces

Berens among nominees for New Faces honor

Jessica Berens '01 was one of sixty-five nominees for the national New Faces of Engineering Award during February.



The New Faces program highlights the interesting and unique work of young engineers and the resulting impact on society. Young engineers with two to five years of experience are the focus of the program.

Fourteen engineers, one from each of the sponsoring professional societies, were selected as finalists and featured in a USA Today ad.

Berens was one of five nominees from the American Society of Mechanical Engineers.

Originally of Milbank, Berens was an "excellent student" whose "grades continued to improve as she went through the curriculum," recalls Mechanical Engineering Department Head Don Froehlich. He adds that she graduated with more credits than required.

For her student design project, she worked with a team that entered a Society of Automotive Engineering Aero Design Contest.

"They had a fun time of building a remote control plane that was within power and weight parameters," Froehlich says.

Now Berens is a mechanical design engineer for IBM in Rochester, Minnesota, working in the Product, Power, Packaging, and Cooling area. Berens provides direction to designers on part designs and concepts, assigns

work items, tracks all issues to closure, and implements cost-reduction opportunities.

She also works with the media team and suppliers to help shape the future drives that IBM will use and communicates with project teams to help them understand drive requirements.

Berens volunteers with the IBM Employee Charitable Contribution Campaign and the Exploring Interests in Technology and Engineering (EXITE) Camp for sixth-grade girls. She is involved in Engineers Week, MentorPlace, and is president of the New Hire Connect group.

She has five patents and five technical publications, was awarded the title "Early Tenure Innovator" in 2004, and is an active member of the Rochester Hardware Invention Review board.

Also in 2004, Berens earned a master's in business administration from Cardinal Stritch University, Rochester branch.

Noteboom gains honor in Colorado

Another SDSU graduate received a state nomination for the New Faces award.

Matthew Noteboom '99 was one of five engineers from the state of Colorado to be nominated as the New Faces selection for the American Council of Engineering Companies. He was not among the final four nominees that the council submitted for the national award.

Noteboom, a civil engineering graduate, works at Richard P. Arber Associates in Lakewood.

He received his master's degree in environmental engineering from Colorado State University in 2001. He has been involved with water and wastewater treatment projects in Colorado for the cities of Alamosa and La Junta, and the Cortez Sanitation District.

Pictured L to R: Rick Arber, Steve Ravel, Ben Johnson, Matthew Noteboom, and Brien Gidlow of Richard P. Arber Associates



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ALUMNI NEWS

George Robert Durland, professor emeritus of Agricultural Engineering, died January 26, 2005, at Brookview Manor in Brookings.

A 1953 graduate of State's ag engineering program, he worked forty years at the University, retiring in 1995. He received his master's degree in ag engineering in 1968 and authored many bulletins for the Cooperative Extension Service. A memorial fund has been established in the Agricultural Engineering Department.

Greg Guyer '01, agriculture & biological systems/civil engineering, is managing the Mankato, Minnesota, branch of American Engineering and Testing.

Carmen (Fink) Kasner '90, civil engineering, works as a senior project manager in the Encinitas, California, office of PBS&J and on a contract basis as the city engineer for Del Mar, California. She and her husband, Kevin, who works for Sweetwater Authority, a publicly owned water agency, have two children, Kyra, 3 1/2, and Kyle, 1.

Gary Nelsen '59, electrical engineering, Carmel, Indiana, has retired after forty-seven years of flying airplanes—twenty-one years with the Air Force, three years with Boeing, and twenty-two years as chief test pilot for United Airlines.

Marjorie Skubic '76, physics, is working with computers and eldercare at University of Missouri-Columbia. An associate professor in the electrical engineering and computer engineering/computer science departments, Skubic's current research includes investigating computational intelligence techniques for studying sensory perception and interactive human-machine interfaces, and applying them to robotics, gait analysis, and now eldercare.

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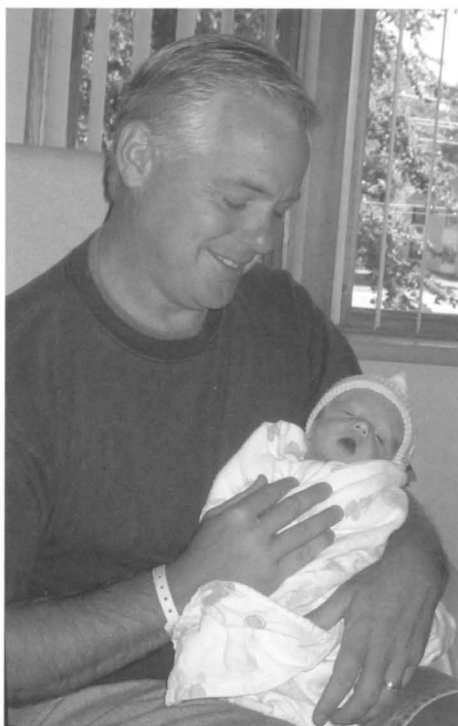
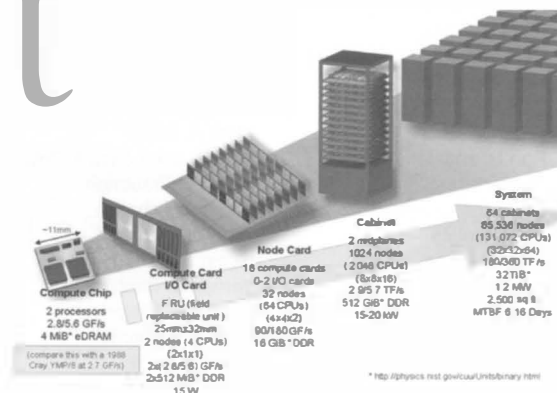
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Superfast

EE grad leads IBM team in designing world's fastest computer



It would take 2,000 laptops to equal the performance of one rack, or section, of the BlueGene/L—the world's fastest supercomputer.

Tom Liebsch, a chief engineer and a lead architect for IBM in Rochester, Minnesota, led an IBM engineering team to design and build—literally—the world's fastest Supercomputer. “It helps out a great deal for companies with new drug discoveries,” says Liebsch, explaining that the computer is used for biology and life-science research, such as Alzheimer’s studies.

BlueGene/L gains its name IBM’s traditional color and the program’s primary-research function.

“It’s not intended for small, small use, [but] any type of large research project it has a pretty good use for,” he says, noting that the computer won’t find its way into the average American’s home.

The BlueGene/L, which took about four years to develop, is already being manufactured—primarily in Rochester, Minnesota—and used by companies across the nation.

Each rack of the BlueGene/L is about seven feet tall, and as many racks as needed can be hooked together to function as one computer. Currently, Lawrence Livermore National Laboratory in Livermore, California, houses the largest BlueGene/L at sixty-four racks.

Liebsch, a Brookings native and SDSU engineering graduate, teamed with dozens of

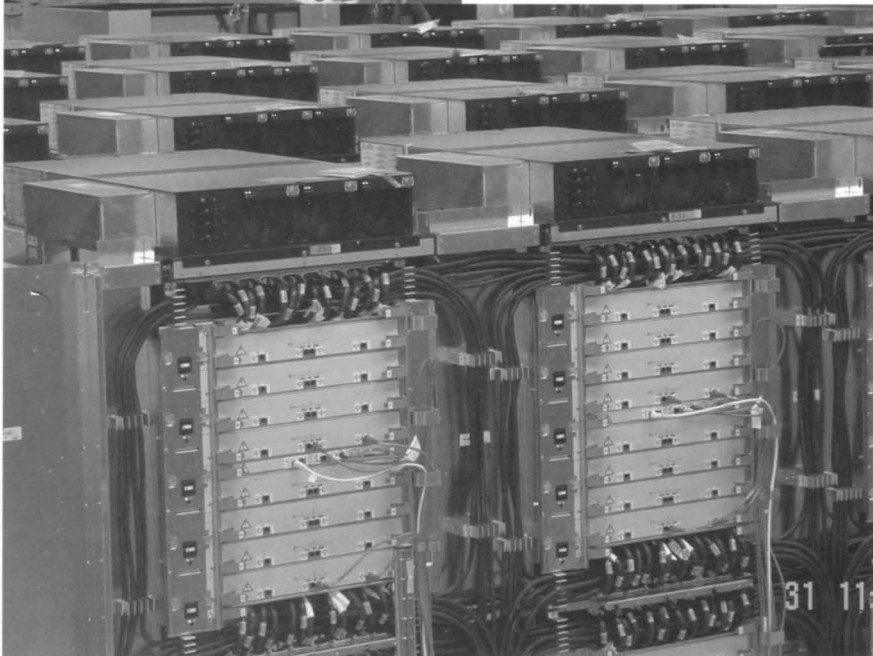


Illustration top:

The BlueGene/L supercomputer operates with a two-processor computer chip, which are assembled on computer cards. There are sixteen computer cards on each node card and 1,024 nodes per cabinet. With sixty-four cabinets, the system has a total of 65,536 nodes. The system takes up 1,600 square feet, the size of an average house.

Tom Liebsch’s infant son, T.J., shows no interest in dad’s laptop in this July 22 photo.

Photo left:

The BlueGene/L supercomputer is pictured without covers on. Each BlueGene/L rack is designed by IBM, and manufactured in Rochester, Minnesota. Currently, it is the No. 1 supercomputer in world, as reported by TOP500.org. Each rack can perform a peak of 5.7 trillion calculations per second, and when 64 racks are connected together, it will be nearly 360 trillion calculations per second peak speed. That is almost more than ten times the previous No. 1 supercomputer.

others from IBM on the project. Their efforts won the *EE Times* magazine Annual Creativity in Electronics (ACE) Award for Design Team of the Year in March.

"We knew it would fit the contest. It was just a matter of when we would enter. We're sure happy with how it turned out," he says.

The *EE Times* ACE Awards were created to recognize the people, companies and products that show leadership in the electronics industry. It honors those who are true innovators of technology, leading the way and making positive contributions to society.

Beating four other teams for the award, IBM's supercomputer replaced NEC Corporation's EarthSimulator in Japan as the fastest computer in November. When the list was updated in June, it still held on to the top spot at nearly 138 teraflops, or trillions of calculations per second.

In addition to outperforming its rival, the BlueGene/L also uses less power.

"Power is a very large thing for these users. One megawatt of power cost about \$1 million last year," says Liebsch. The Japanese Supercomputer uses about 6.8 megawatts of power a year compared to the 1.8 megawatts that it takes to run the BlueGene/L.

"It's really been a great project. We got it done on schedule. The teams really pulled together," says Liebsch, who has worked with IBM teams from all around the United States. "There were many other SDSU alumni also helping on Blue Gene. They were such an important part of the project."

Liebsch received his electrical engineering in 1985, and his master's from State in 1987. Liebsch says that the "cross-disciplinary" training that he got from SDSU's engineering program was a huge asset in working on the BlueGene/L project. "Not just electrical engineering, but

electrical, computer science, mechanical and manufacturing," he says.

Dennis Helder, head of electrical engineering, remembers Liebsch as a graduate student taking his class: radio frequency electronics.

"I remember Tom was distinguished in class, so I'm not surprised he's distinguishing himself professionally," says Helder, noting that Liebsch's accomplishments say something for SDSU.

"Tom's recent success clearly indicates quality engineers come from South Dakota, and also indicates there is success as well through the engineering education at SDSU," says Helder.

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I wish to contribute to the SDSU College of Engineering through the Greater State Fund.

The College of Engineering appreciates the generosity of alumni and friends who have made gifts to the College and asks that you encourage others to contribute. All donations should be made payable to the Greater State Fund and designated for the College of Engineering. Mail to: **SDSU Foundation, Box 525, Brookings, SD 57007**

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Summer 2005

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As I near the first anniversary of becoming the director of development for the College of Engineering, I have been overwhelmed by the loyalty and generosity demonstrated by our alumni.

From the recent graduate working on the design of computing servers to the senior executive vice president in a major telecommunications corporation, there is a common thread: All talk frankly about how SDSU impacted their career.

In so many ways, alumni and friends are faithfully supporting the College in its mission to develop tomorrow's leaders in the fields of engineering, computer science, math and statistics and physics. This is accomplished through donations to the Greater State Fund, the Jackrabbit Guarantee and other specific scholarships and programs. This issue of *Impulse* recognizes our donors, who provide financial support for these programs. If you would like information on how you can help, call me at 888-747-7378 or e-mail me at tim.reed@sdsufoundation.org.

I want to also acknowledge those who give their time and expertise to assist the College. We are grateful for those who offer internships, promote the hiring of SDSU graduates, serve on advisory councils, and work with faculty on program improvements.

You can be proud of the College as it continues to produce some of the nation's top engineers. We couldn't do it without the support of our alumni and friends.

Tim Reed

Director of Development, College of Engineering



Tim Reed at the SDSU Foundation
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8,500 copies of this publication were printed with financial support of alumni and friends.

MAKING A LEARNING CONNECTION

College of Engineering



Hill Climber – Mechanical Engineering Instructor Derek Hengeveld, right, judges the hill climbing contest during the Engineering Expo April 22. Students had to design and fabricate a vehicle that climbs a ramp under its own power, stops at the top, and sustains its position against an opposing vehicle coming up the other side of the ramp.

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