

IMPULSE

Computer Pioneer Amdahl Honored as Centennial Alumnus





BUCKLEY

**CHANGE IN INTELLECTUAL CLIMATE
STIMULATES ECONOMIC GOALS**

The climate in South Dakota has changed. Beginning in November 1986 and continuing for more than a year, there was little snow and no severe cold. The intellectual climate, measured in public attitudes, also has changed, dramatically, for the good.

Under the new administration of Governor George Mickelson, elected to office in November 1986, developing public support for higher education became the official policy of state government. Rejecting the traditional pride in poverty that has inhibited technical advancement in South Dakota for so long, our new Governor refused to "manage misery." He committed the state to a bold, new course of positive action with economic development as the principle goal. The entire system of higher education, and especially the faculty of our engineering and scientific programs, is being encouraged to participate in building effective partnerships with industry.

Who would have believed, two years ago or 20 years ago, that South Dakota could compete in a credible fashion with more powerful and wealthier states for multi-million dollar projects that will provide thousands of highly technical jobs?

The Superconducting Super Collider (SSC) will be the largest experimental machine ever conceived. South Dakota competed for it as the Northern Great Plains site, supported by all the contiguous states. We didn't get it, but we benefited from the effort. One of the most important products of the regional concept applied will be the Northern Great Plains Water Resources Research Center, a scientific and engineering center of excellence that is proposed for SDSU and supported by neighboring states.

The Advanced Technology Laboratory was announced, to be established somewhere in the 14-state area served by US West. South Dakota competed effectively. We didn't win, but we didn't lose either. The laboratory will be sited in Colorado, but South Dakota's educational institutions are being invited to participate in the telecommunications-related research.

SEMATECH is a concept advanced by a consortium of semiconductor manufacturers. Production-related research is intended to help the United States regain the position of leader in international markets. Proposals for locating the laboratory were solicited, and South Dakota proposed a site in Brookings. Again, we didn't win. But, by being competitors, we came in close touch with AT&T at Lees Summit, Missouri. We have been supporting selection of the site in a suburb of Kansas City. Whether that effort is successful or not, South Dakota will have gained much.

The positive approach produces results. The establishment of the South Dakota Community Foundation was announced recently. It is sponsored jointly by the 3M Foundation, the McKnight Foundation, and the State of South Dakota. A fund-raising campaign is now involving all the people of South Dakota. Proceeds from the Foundation will support charitable activity, education, research and development.

Ernest Buckley, dean (on leave of absence)

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IMPULSE

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INNOVATION

APPLIED RESEARCH AND SERVICE PROJECTS WIN ECONOMIC DEVELOPMENT FUNDING

Higher education continues to play a role in South Dakota's economic development with more than \$3 million recently targeted by the Governor's Office of Economic Development for research and for each college and university to establish a Center for Innovation, Technology and Entrepreneurship (CITE).

Dr. Paul Nordstrom, CITE director for SDSU, says the centers are part of Gov. George Mickelson's major thrust in statewide economic development.

"It's really an opportunity for campuses to expand their roles and provide better service to communities, industries and organizations in South Dakota in the area of economic development," Nordstrom says.

Specific projects are being funded in two phases. For the first phase, \$500,000 has been designated for short-term applied research and service projects that could support economic development in the state. Those funds were made

available to educational institutions on a competitive basis, says Nordstrom, for projects to be completed by the year's end.

SDSU faculty submitted 21 proposals to Nordstrom. Eleven were sent on for review by a committee of CITE directors from all campuses. Guidelines requested proposals for applied research projects in direct support of jobs related to innovative enterprise, technological advancement or process development. Service projects, says Nordstrom, were to focus on consultation and supporting help by faculty and staff, which could benefit industrial and commercial firms and nonprofit and public entities.

Two of the five SDSU proposals

selected for funding were engineering projects. Providing the key technology for affordable radio and television service for remote communities is the goal of one proposal. The other project funded is an effort to put South Dakota manufacturers in the running for aerospace contracts.

According to Nordstrom, CITE directors are establishing guidelines for long-term projects which also will be competitive and will be supported with the major share of CITE funding, \$2.8 million. That money is targeted for basic and applied research designed to provide long-term economic development benefits that address the critical needs and interests of South Dakota.

AEROSPACE CONTRACTING

CAN S.D. SMALL BUSINESSES GET ON THE BIDDERS' LISTS?

Sioux Falls businessmen Bob Baum, at left, and Paul Selby



A Brookings manufacturer thinks SDSU may be his link to working for the aerospace/defense industry. So do manufacturers in Freeman, Yankton, Volga, Sioux Falls and other towns and cities around South Dakota.

These manufacturers met at SDSU recently with James Ceglian, program director for engineering extension, to discuss plans SDSU has for helping them get on the bid lists of major aerospace companies in the country. With a grant of nearly \$43,000 from the Governor's Office of Economic Development and the help of an alumnus with contacts in the industry, Ceglian will attempt to match South Dakota manufacturers with major

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Willis Nesheim



James Ceglian

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aerospace/defense industry companies so they can negotiate for contracts.

Willis Nesheim, St. Louis, Mo., a Highmore native who was graduated from SDSU in electrical engineering in 1959, is retired chief of standards in engineering for McDonnell Douglas. Now, he says, he will use the contacts he built within the aerospace industry to introduce South Dakota manufacturers to key people.

"What I'm really doing is setting up blind dates for these companies," Nesheim says. What the companies do once they are on a bid list and are offered a bid is up to them, he adds.

Nesheim has identified prime contacts at major companies in Dallas, San Diego, Indianapolis and Dayton.

Nesheim and others, who are called the Governor's representatives, will present literature about the companies and their products directly to contractors. Another representative will be Joseph A. Kobylack, 1953 SDSU engineering graduate from Dayton, Ohio.

Ceglian says the fact that federal regulations require that the aerospace/defense industry contract with small business gives South Dakota businesses an edge. A small business is defined as one with 500 or fewer employees. Ceglian says approximately 91 percent of South Dakota's employers have 20 or fewer employees, and he adds, they are competitive in terms of quality and prices.

Like Nesheim, Ceglian says the program's success depends on the participants. "We're going to

provide them with an avenue. Once they get a request for a bid, they'll have to follow up on it."

Dave Bertelson of Prest Rack, Inc., Brookings, says his company hopes to get an angle on how to promote itself through SDSU. "We're always looking for a different avenue to get the word out," says Bertelson.

Prest Rack, Inc., produces heavy-duty industry steel storage structures. "We have an efficient way to make their storage fit into the smallest cubic space," he says.

Bill Freeburg from the Freeman Company in Yankton says his company produces fittings to specifications for control assemblies on aircraft. "We're looking for more complicated machining jobs," he says. Plus, Freeburg adds, "more volume is an easier way to do business."

Bob Bonner with Wilbrecht Electronics in Huron and St. Paul, Minn., says his company manufactures miniature electronic switches that are placed in medical

electronic devices like hearing aids, pagers or nerve stimulators. Most of their assembly work is done under microscopes. He feels their precision work might have a place within the aerospace industry.

Don Endres, from Special Teams Co., a computer software company in Brookings, says the company has sold software to the U.S. Postal Service and it would like to go further. "We're just a new company looking for business," he says.

Some companies may have to modify their product or packaging methods to meet the industry's specifications. Some may fit right in. "If you don't take the time to invest in an opportunity to the fullest, you may lose out," Ceglian says.

Ceglian has been director of the engineering extension office at SDSU for 10 years. He obtained his bachelor's degree in mechanical engineering from Purdue University, Lafayette, Ind., and his master's in education from SDSU.

South Dakota manufacturers met with Ceglian to hear ideas for getting work with the aerospace/defense industry.



TERRASAT

AFFORDABLE RADIO AND TELEVISION SERVICE FOR REMOTE COMMUNITIES?

A technology being developed in South Dakota may be the key to providing an economically feasible television and radio service to isolated communities around the world. It's the TerraSat System developed by Anderson Scientific, Inc., in Rapid City.

With the help of SDSU's Dr. Douglas Miron and a grant of \$17,000 from the Governor's Office of Economic Development, the system is being made an even sounder investment. Potential uses will include cities, countries or isolated islands that cannot afford the cable system commonly used in the United States, to aid in the transmission of satellite signals.

The grant will help support Miron's and Anderson Scientific's work and is part of Gov. George Mickelson's effort to promote economic development in South Dakota.

Miron, an associate professor of electrical engineering at SDSU, says cable systems are too expensive in areas of low population.



Douglas Miron

The TerraSat system uses a single central transmitter to broadcast up to 24 channels of television directly to a unique decoder located in each home or business in the service area. Miron's part is to develop a bandpass filter that would allow the passage of a band or range of frequencies composing one channel and reject all others. "They'd be able to select one channel out of 12 or 24 of the satellite television signals and pass that one channel to an inexpensive power amplifier to rebroadcast," Miron says.

The number of channels available to the customer would depend on how much a community wanted to spend on the system. The maximum available on one satellite is 24 channels.

The addition of the bandpass filter to the system would eliminate potential problems. Putting all 12 or 24 channels into one amplifier requires one which prevents the interference of channels, says Miron. The filter would select the desired channel signal and decrease the opportunity for interference. The signals would then be recombined in a network and sent through a standard antenna.

The power amplifier could be bought or built for under \$40 per channel. "With a dozen channels, that's still only \$500," Miron says. The entire central system ideally would be bought by a community or small country. Individual customers would need to buy an antenna, probably for under \$50, and the decoder for approximately \$200. The TerraSat package would include the sale of the decoder and the antenna to individual receiving stations.

Joe Massa, president of Anderson Scientific, Inc., says the TerraSat System may become a reality within six months.

The company has produced prototypes of the system, and Miron is developing the filter at SDSU. "The filters are an integral part of the transmitting unit," says Massa. "You have to separate the channels you're transmitting so they don't interfere with each other or with other channels in the area."

Massa says his company turned to SDSU for assistance because the university, particularly Dr. Miron, offers experience and expertise in radio frequency (RF) and microwave technology. In 1984 Miron was granted more than \$200,000 from the Air Force Department of Defense with matching funds of more than \$44,000 from SDSU's College of Engineering to create a RF electronics laboratory at SDSU.

Massa says Anderson Scientific has been working on the TerraSat System off and on for about five years. "We've done some preliminary marketing and have a high level of interest from all around the world," he says.

The company now employs between 35 and 50 people. If it goes into production of the system, employment figures would increase, although Massa is unsure how much. Anderson Scientific would be manufacturing the transmitting unit, the filter and the decoder, so production "would depend on the number of units we sold and the number of homes we'd be serving," says Massa.

Miron, who joined the SDSU staff in 1979, recently was named Distinguished Amdahl Professor for the next two years in the College of Engineering. Miron received his bachelor's degree in electrical engineering and his master's in controls in 1962 and 1963, respectively, from Yale University, and his doctoral degree in controls from the University of Connecticut in 1977.

AMDAHL

COMPUTER DESIGNER HONORED AS SDSU'S CENTENNIAL ALUMNUS

One of the nation's foremost computer designers was honored as a Centennial Alumnus by the National Association of State Universities and Land-Grant Colleges (NASULGC) Dec. 12 at SDSU.

Gene Amdahl, a 1948 engineering physics graduate, was presented a special bronze medallion as the Centennial Alumnus of SDSU as selected by the national organization. The presentation took place during SDSU's winter graduation ceremonies.

The NASULGC selected a single alumnus from each of the land-grant schools in the country to be presented with the medallion during the group's centennial which was celebrated recently in Washington, D.C. Each land-grant institution in the country was allowed to nominate alumni for the Centennial Alumnus Award from among their graduates.

SDSU President Robert Wagner says Amdahl is an excellent choice as a Centennial Alumnus as he "has been a driving force and a creative mind in the growth of the nation's computer technology. Gene Amdahl's contribution to science and to the development of this new technology marks him as one of the nation's outstanding computer scientists and entrepreneurs. He epitomizes the Land-Grant System."

Amdahl currently lives in California and is the founder of two corporations now engaged in computer design and distribution.

A farm boy who grew up near Flandreau in Moody County of South Dakota, Amdahl has been heralded by many people for his insight and creative genius focusing on computer development. *Newsweek* magazine referred to Amdahl as "the legendary computer designer" when writing on his new superchip design in 1983.

attention in the industry. In 1979, he again set out on his own, establishing Trilogy, Ltd., a more internationally-oriented computer company.

In addition to his quest to develop and build the best computers in the world, Amdahl has been generous to SDSU. The university currently has a Gene Amdahl Lectureship Endowment in Engineering; a special equipment endowment for items needed in the College of Engineering and in the performing arts areas; and an Amdahl-Reinhart Scholarship in Engineering Physics. Gifts from Amdahl and his family also assist in funding an academic chair in the SDSU College of Engineering.

Amdahl praises his undergraduate education at SDSU. He took his first course in physics, "which captured my interest and imagination," from the late Raymond Reinhart. "From that time on," says Amdahl, "I had two goals—understanding the nature of the physical phenomena around me and applying this knowledge to the solution of a wide variety of problems of both practical and intellectual interest.

"I found my education at SDSU benefited very much from the stimulating close personal interest in my development which was shown throughout my contact with the Engineering Physics Department," Amdahl says. "I feel this environment was largely responsible for my success in the field of computer system design."

Amdahl went on to earn a master's degree and then a Ph.D. in theoretical physics from the University of Wisconsin.

Amdahl is the recipient of numerous awards recognizing his work in the computer development field. In 1970 he was named as an SDSU Distinguished Alumnus and in 1974 received an honorary doctorate degree from SDSU.



Gene Amdahl, left, and Douglas Miron, Distinguished Amdahl Professor in SDSU's College of Engineering.

Amdahl first began work for IBM in 1960 and led the technical team that developed the famed IBM 360 series, the most widely used computer line in the world. In 1969, he was named an IBM Fellow, free to pursue any projects he desired.

In 1970, Amdahl established his own business, Amdahl corporation, which produced computers which attracted

HEAT POWER LAB

RENOVATION SAVES ANTIQUE STEAM ENGINE FOR INSTRUCTION

The \$190,000 renovation this fall of SDSU's mechanical engineering laboratory created additional heat power lab space that is being upgraded with new equipment. But it also saved an antique that is still of value for providing SDSU engineering students a unique introduction to the fundamentals of steam power, turbines and internal combustion.

Dr. Hassan Ghazi, professor and head of the Mechanical Engineering Department, says the heat power laboratory gives students a place to test the theories they have learned in the classroom. "We teach them the theoretical principles, and then they verify them by checking them in practice," Ghazi says. "They can see if what the theory says actually happens in real life."

New equipment in the heat power lab will include reciprocating machines and vibration testing equipment. According to Ghazi, approximately 60 students use the SDSU laboratory facilities for about four hours per week each semester, working with air

conditioners, heat pumps, air compressors, blowers, fans and other equipment.

The heat power lab was built in 1903 adjoining the SDSU heating and power plant. Restoring the lab in 1987 has allowed mechanical engineers to continue operating an antique steam engine located in the lab. Dr. Ernest Buckley, dean-on-leave for the College of Engineering, says that had the building been razed, instead of renovated, the steam engine would have been lost. SDSU's students, unlike others, are able to use a steam engine, not just read about it, Buckley says.

The heat power lab is run by Professors Kenneth Christianson and Clayton Knofczynski, who have been conducting experiments there since the 1950s. Knofczynski says the steam engine operates today as well as it did 50 years ago. "The basic principles of engineering do not change. Here the student can see the historical, as well as the theoretical development, of those principles that are the

Hassan Ghazi

Kenneth Christianson



Clayton Knofczynski

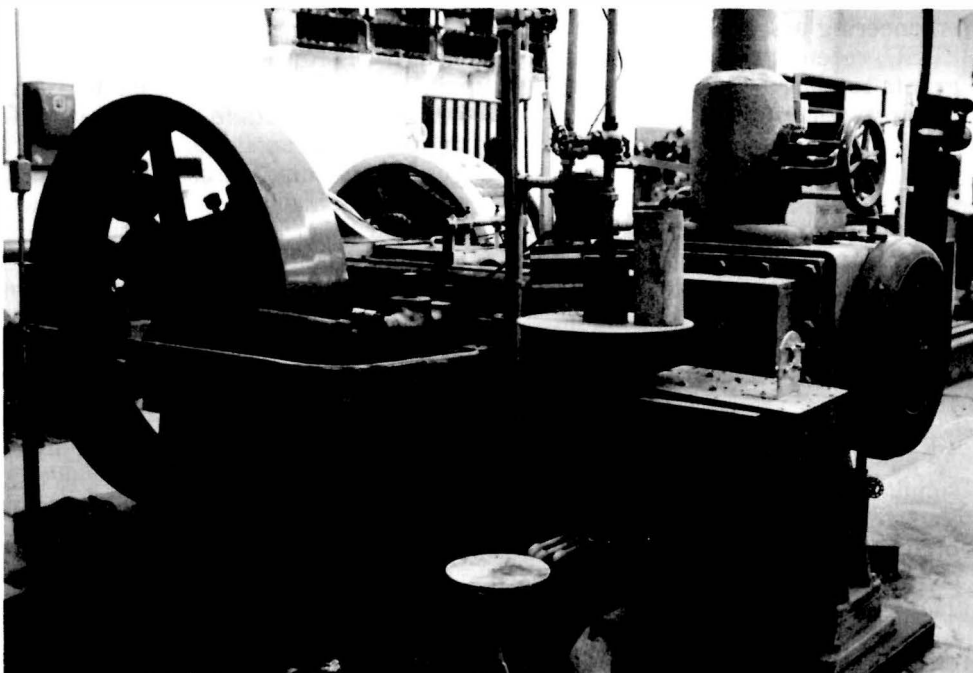
foundation of an advancing technology," says Knofczynski.

The renovation of the heat power lab primarily involved stabilizing the outside walls of the building, as well as structurally strengthening the building to support a new roof. The repair job, which took about seven months to complete, also included replacing the structure of one of the main campus heating tunnels under the Mechanical Engineering Laboratory.

Ghazi says the building, which is the oldest on the SDSU campus, will now be a more pleasant place to work.

The SDSU Maintenance and Repair Fund absorbed the cost of the repair. Low bidder H.E. Mills Construction Co. of Brookings was contracted to do the job.

The Heat Power Laboratory's antique steam engine is still of value for teaching students the fundamentals of steam power, turbines, and internal combustion.



THE SINO/SDSU CONNECTION

HUANG OPENS DOOR TO CHINA AND ITS ENGINEERING PROGRAM

As the world has become smaller through advanced communications and space travel, the boundaries of the SDSU College of Engineering have been expanding.

In 1946 a student from Lima, Peru, became the first international student to attend classes in the SDSU College of Engineering. Since then, numerous international students have passed through the SDSU engineering program and numerous international professors have brought their expertise to SDSU. In 1986, 165 international undergraduate students were registered in the College of Engineering. Currently, 13 of the 92 full-time professors in the college are from other countries.

The presence of international professors and students gives both American and international students an opportunity to share and compare their skills and expertise, says Dr. Paul Nordstrom, SDSU's director of international programs. "It behooves us as a nation and as a university to view things internationally and not provincially," Nordstrom says.

Many students and professors are sent to SDSU's College of Engineering by their home countries. Others participate in exchange programs or apply for admission on their own initiative because they are interested in studying in the United States.

Teckseng Lim, a lecturer in computer science from Singapore, applied for a teaching position in the SDSU College of Engineering after completing his master's degree at Moorhead State University, Moorhead, Minnesota. "I like it," says Lim, about Brookings and SDSU. "People are friendly and easy to get along with."

International students and professors have different reasons for choosing the SDSU College of Engineering, but two

reasons are prevalent — the high quality of education at a low cost and the small size of the university and the community.

Xia Huang, a full-time visiting lecturer and researcher in engineering, is on leave from Shaanxi Institute of Mechanical Engineering in Xi'an, China. He came to the SDSU College of Engineering about one and a half years ago to research numerically controlled machine tools and to teach engineering mechanics, a theoretical engineering class. Xia says he became aware of SDSU through a relative who knew Dr. Ernest Buckley, dean on leave from the College of Engineering. Zia's son, Zin Huang, also is at SDSU as a graduate student in engineering.



Buckley, who arranged for Xia to come to SDSU, will spend two weeks in China in late March, lecturing at the Shaanxi Institute on reinforced concrete, fiber reinforced concrete and shallow foundations for expansive clay soil. He also plans to explore economic development opportunities for South Dakota that may exist in China.

"Huang was our door-opener to the People's Republic of China and its

PAN RESEARCH GOAL: A MORE DURABLE

George (Guang-Wen) Pan, electrical engineering associate professor at SDSU, recently received two research grants totaling \$474,000 for making faster and more durable computer chips able to withstand high levels of radiation.

Pan's first project, with a \$144,000 grant through the Mayo Clinic, is for the simulation and modeling of a high-speed digital signal processor in computers. Pan began the project last February and will continue it through 1989.

As an authority on modeling and simulation for high-speed packaging, Pan says this project is useful to predict the performance of high-speed computers before they are constructed. This type of simulation could be used to insure the success of deep space probes, shuttle missions and satellites.

Pan's second research grant is for \$330,000 from the Defense Advanced Research Projects Agency where he will work with gallium arsenide (GaAs) integrated circuits for microwave and digital circuit applications for next generation computers. This project starts in January 1988 and runs through 1991. Pan says gallium arsenide chips are superior to conventional silicon chips for military and biomedical needs, but gallium arsenide is more expensive than silicon.

Special processors in computers are useful, explains Pan, because they offer a different and sometimes easier way to compute. The chips can be specialized for specific jobs.

Pan, 43, is from China, and has been in the United States since 1980. He



From left to right, Don Froehlich, acting head of the General Engineering Department; Dennis Loban, engineering technician; Duane Sander, acting dean of the College of Engineering; and Xia Huang, visiting lecturer and researcher from Xi'an, China, with a computer numerically controlled lathe in the SDSU Engineering Shops. It is used to instruct students in computer-aided machining.

engineering program," says Buckley. "We hold them (international students) in high regard. They work hard and are good students."

ABLE COMPUTER CHIP

received his undergraduate degree in mechanical engineering in China, his master's degree in 1982 and his doctorate in 1984, both from the University of Kansas. Pan worked at the University of Texas as a post-doctorate fellow and then went to work at the Mayo Clinic. Pan says his current research through the Mayo Clinic is contracted to SDSU and subcontracted to the U.S. Department of the Navy. He says the clinic wanted to continue his research after he left.

Pan may be working full-time next year conducting research at SDSU for industries. He says Gov. George Mickelson has expressed interest in bringing industries to South Dakota and wants to get SDSU's Engineering College involved in more industrial research for its faculty and students.

LATIF

STUDENT EARNS CREDIT AT SDSU FOR DOCTORAL DEGREE IN EGYPT

Transportation problems in Egypt have brought a young man from that country to South Dakota for assistance.

Hatim Abdel-Latif, a graduate student in the College of Engineering at Ain-Shams University in Cairo, Egypt, is attending SDSU through what the Ministry of Higher Education in Egypt calls a channel system. Students in Egypt working toward doctoral degrees in science and engineering must spend one to two years working with an academic adviser from outside the country. Latif is working under the guidance of Dr. Ali Selim, professor of civil engineering in SDSU's College of Engineering. Selim says the channel system will expose Latif to outside technologies.

Although SDSU's College of Engineering does not currently offer a doctoral degree, academic credits Latif secures through SDSU will transfer back to his university and be counted toward his doctoral degree requirements, which he will complete in Egypt.

Selim, who served as a consultant with the Egyptian Department of Transportation and the Department of Interior in 1984-85, was asked to be Latif's adviser because his research efforts in transportation-related problems will enhance Latif's education.

Latif's research work deals with inter-city/rural transportation problems in overpopulated regions of Egypt. He wants to improve the existing system to better meet the people's needs. The country's 50 million people live on the 4 percent of its land that is habitable, says Selim. Because few people in Egypt own cars, travelers rely heavily on public transportation like buses, trains and taxi services for travel between cities. "Trips in the

magnitude of 30 to 200 miles are commonly taken by taxi," he says.

"Taxi service is commonly seen in urban areas, but due to congestion problems and overpopulation of the inhabited areas of Egypt, taxi services have been expanded to serve the rural commuters," says Selim. Vans often are utilized as taxis, and the driver will not leave the terminal until the van is full.

"This type of taxi service is constantly faced with problems because of lack of departure and arrival scheduling, government deregulation of this type of service and a bad road network," Selim says.

Most rural highway systems are two-lane highways, says Latif. Few miles provide travelers access to multi-lane systems, increasing the need for an efficient taxi service. Latif says he wants to improve this service by investigating factors that better quantify the rural passenger who uses taxi services.

Latif works as an assistant lecturer at the university in Cairo. While at SDSU, he plans to take as many advanced-level courses as possible, especially courses not available to him in Cairo. He plans to visit other transportation research facilities in the U.S. before returning to Egypt.

Selim, who has been on the engineering staff at SDSU since 1977, is noted for his research on the use of quartzite in asphalt pavement. Quartzite is considered an especially strong construction material. Selim received his doctoral degree in civil engineering from the University of Missouri, Rolla, and his bachelor's degree in civil engineering from Ain-Shams University.

WOMEN ENGINEERS

SDSU'S GRADUATES CHALLENGE THE BARRIERS OF A TRADITIONALLY

SDSU's female engineering students have never let the barriers that accompany entering a traditionally, male-oriented field keep them in the background.

In 1887 two women, Nina Updyke and Alice Robinson, enrolled in one of SDSU's first-ever engineering classes. Records don't show what occupations they ultimately pursued, but the fact that they challenged their "proper" roles and enrolled in a class dominated by males made SDSU women leaders in the field of engineering.

One hundred years later, women continue to be leaders in SDSU's College of Engineering. Although they compose only about 15 percent of the student population, women constitute about 50 percent of the leadership in engineering student clubs and organizations.

Recent female graduates in engineering are evidence of the progress women have made in a non-traditional field. Polly Foss, Susan Rollag and Kathy Waples all graduated from SDSU with degrees in engineering. Each is now employed in the field.

Foss, who was graduated from SDSU in agricultural engineering in 1986, works as a manufacturing engineer at 3M in Brookings. She started at \$30,000 annually and has since received raises. Foss supervises the production process of different products from the raw material stage to completion.

Foss believes women engineers can do well, despite sex biases. "If a woman in engineering is ambitious, she can possibly get more recognition, because she's not easily forgotten," Foss says. She has, however, faced problems because of her gender. While working as an engineer in Texas, she says she dealt with men who "had a hard time

listening to a woman." She also has noted a lack of women in management positions in engineering. "People have a hard time believing a woman can be a plant manager. I hope to get around that," she says.

Foss was graduated from SDSU with a 3.7 grade point average. She chaired the 1986 Engineering Exploration Days, was president of the ASAE and was active in Mortar Board. She and classmates initiated the now bi-annual *Impulse*, as well as the Phon-a-thon, Engineering Exploration Days and an engineering newsletter. Her sister, Ann Hanthorn, was graduated from SDSU in agricultural engineering in 1976.

Susan Rollag received her degree in civil engineering from SDSU in 1983. She works for the Department of Water and Natural Resources in Pierre in the Office of Air Quality and Solid Waste. Rollag reviews plans and specifications for proposed operations to be sure they conform with state and federal regulations. Out of approximately 60 to 80 engineers and biologists working for the department, she estimates four or five are female engineers.

Rollag says "old" ideas about women do surface in her occupation. "Some people think women belong at home. When you work with those people, you're slightly uncomfortable," she

says. She is aware of instances where women employed in engineering in the private sector have been paid less than men, despite being equally qualified.

Rollag says her "natural aptitude for math" led her into the field of engineering. "I also have a dad who's an engineer and he has encouraged me," she says, referring to Dr. Dwayne Rollag, professor and head of SDSU's Department of Civil Engineering.

Kathy Waples, originally from Aurora, graduated from SDSU in civil engineering in 1981 with a grade point average of about 3.6. She continued her education at the University of Missouri, Rolla, receiving her master's in engineering management in December 1982. She started her career as an outside plant engineer for Wisconsin Bell Telephone Co.,



Polly Foss



Susan Rollag

MALE FIELD

Milwaukee, staying with them for three years. During that time, she also worked in strategic planning and later was transferred to Madison, Wis., where she worked as a construction foreman.

Today, Waples earns about \$48,500 annually in Kansas City, Mo., working as a senior planner for US Sprint, a long-distance telephone company owned by United Telecom and GTE. She started for US Sprint in 1985 as an outside plant engineer, was promoted to network planner in October 1986 and last July became a senior planner for their fundamental planning office. Nationwide, US Sprint employs around 7,000 people, Waples estimates, and the Kansas City division employs around 2,000.

Waples says she became an engineer because she had always wanted to do something different—"something not

traditional. An engineering career matched up with what I felt I was capable of," she says.

In addition, she says her older brother Rick who was graduated from SDSU with a degree in engineering in 1977, was "kind of like a coach all the way through (college)."

Waples herself has had few problems being a woman in a male-dominated profession, but she says she has encountered "a lot of very traditional males who have a problem with it (a woman engineer).

"If you can gloss over those things, it's a profession with a lot of interesting and helpful people," she says. One problem Waples finds difficult to tolerate is sexism among younger men. "I know they should know better," she says.



Kathy Waples

In the early 1970's the SDSU College of Engineering produced a brochure called "Women in Engineering." In conclusion, the brochure reads, "Once the blinders of ignorance and preconceived false image are removed, women who undertake the commitment to engineering will find ample opportunity and satisfaction in applying a knowledge of the mathematical and natural sciences to utilize the materials and forces of nature for the benefit of all mankind."

Foss, Rollag and Waples have turned the key successfully to a door only men used to enter—a door that women like Updyke and Anderson started opening in 1887.

THE PAYOFF

OPPORTUNITIES ARE INCREASING FOR GRADUATES IN MICRO-ELECTRONICS FIELD

The payoff is good for four or five years of an education in physics or electrical engineering at SDSU.

Graduates from the College of Engineering with majors in physics take off in their careers with starting salaries averaging from \$22,000 to \$34,000, says Dr. Warren Hein, professor and head of the Physics Department at SDSU.

Dr. Virgil Ellerbruch, professor and head of the Electrical Engineering Department at SDSU, says men and women who graduate with majors in electrical engineering are starting out between \$24,000 and \$30,000 or more.

For those with degrees in physics and electrical engineering, opportunities are climbing with the rise of the

electronics industry, one of the largest industries in the nation.

Dr. Duane Sander, acting dean of SDSU's College of Engineering, emphasizes the need for these graduates in the micro-electronics field.

"The engineering physicist and the electrical engineer work hand in hand in this industry," says Sander.

A primary production area is in the development of integrated circuits, as well as the design of those particular circuits into practical applications. The materials aspects of integrated circuits are studied by engineering physicists, and the overall specifications and functions of the circuits are developed by electrical engineers.

The development of industry in South Dakota and in the region will lead to more jobs for engineers in general and to the possibility of keeping more SDSU graduates in the area. "Our graduates are being sought because they come from the Midwest and have a strong work ethic," says Sander.

Employment for graduates in electrical engineering and physics varies. Ellerbruch says many electrical engineers take their education into design jobs, the military and sales. Some, he says, immediately go on to graduate school.

Some graduates in physics have been earning their livelihoods as aerospace design engineers, integrated optics engineers, program designers and educators.

FACULTY DEVELOPMENT

YOUNG STAFF MEMBERS ENCOURAGED TO EARN DOCTORATES AND RETURN TO SDSU

The College of Engineering at SDSU is insuring a stronger future by encouraging young faculty members to pursue doctoral degrees. Nine SDSU faculty are now in the beginning or finishing stages of completing doctoral degrees in engineering.

Faculty development, says Dr. Virgil Ellerbruch, professor and head of the Electrical Engineering Department at SDSU, is critical to the future of the electrical engineering program.

"It is, in the present-day environment, very difficult to hire faculty from outside South Dakota," Ellerbruch says. "Our salaries, environment and industrial opportunities are three things that work against us; therefore, we have started an ambitious program of developing our own young faculty members with the idea that they'll receive their Ph.D.'s and return to SDSU."

The Department of Electrical Engineering will add four Ph.D.'s to its program when Frank Kornbaum, Dennis Helder, and Madeleine and Alfred Andrawis complete their degrees and return to SDSU.

Kornbaum, a Brookings native, is attending North Dakota State University, Fargo, and will return to SDSU in fall 1988. He received his master's in electrical engineering from SDSU in 1984. His doctoral degree will be in bio-engineering and systems engineering. Kornbaum says that because salaries in South Dakota are not competitive, it is tough to recruit young Ph.D. candidates for positions. "You almost have to promote from within," he says. "You have to send young people away and hope they come back."

Dennis Helder received his master's in electrical engineering from SDSU in 1985 and is now working toward a doctoral degree in communication systems at NDSU.

The Andrawis' both came to SDSU to work on master's degrees in electrical engineering in 1979. Both then became instructors for the Electrical Engineering Department, and both are now pursuing doctoral degrees from Virginia Polytechnic Institute, Blacksburg, Va.

Dr. Gerald Bergum, professor and head of the Computer Science Department, believes the value of additional faculty with Ph.D.'s at SDSU is immeasurable to the state of South Dakota and says that faculty development is one way to get more people with doctoral degrees at SDSU.

The Computer Science Department saw faculty member Marty Kenner leave to pursue his Ph.D. at the University of Minnesota, Minneapolis, in the fall of 1986. Kenner has completed all of the required course work, as well as his written examinations, for which he earned highest honors by achieving the top score among 18 candidates. Bergum considers Kenner a top-notch teacher and wants to keep him at SDSU.

Charles Remund, a native of Wilmot, is scheduled to return from the University of Nebraska, Lincoln, in fall 1988 with a doctoral degree in engineering. He received his master's in agricultural engineering from SDSU in 1983.

Fereidoon Delfanian, from Iran, left this fall to work toward a Ph.D. in engineering at NDSU. He earned his master's in mechanical engineering from SDSU in 1980.



Kurt Bassett



Delvin DeBoer

Both Kurt Bassett, a native of Wilmot, and Delvin DeBoer, originally from Twin Brooks, returned this past fall with their doctoral work nearly finished. Bassett earned his master's at SDSU in agricultural engineering in 1983, and DeBoer earned a master's in civil engineering in 1980. When Bassett completes his dissertation, he will have a Ph.D. in engineering from NDSU. When DeBoer has finished his dissertation and a foreign language class, he will have a doctoral degree in civil engineering with an environmental emphasis from Iowa State University, Ames.

BERGUM

ONE OF HIS TOP GOALS IS GETTING SDSU COMPUTER SCIENCE PROGRAM ACCREDITED



Dr. Gerald Bergum has been appointed head of the Computer Science Department at SDSU, after serving as acting head of the department for the last two years.

Bergum says one of his top goals is to get SDSU's program, initiated in 1983, accredited by the American Computing Machinery Society, the only organization that accredits computer science programs nationwide. Program changes and additional faculty with doctoral degrees would be a step in that direction, he says.

"Changing courses to keep up with the rapidly changing pace of software and hardware in the computer science area is one way to ensure that students receive the best education," says Bergum, adding that staff members who are alert to changes in the field can help make that happen.

"I think we have extremely dedicated teachers and a cooperative department that is willing to help me strengthen the program in every way they can," he says.

The addition of 13 new microcomputers for student laboratories will also help maintain a strong program at SDSU. "We'll be able to teach all entry level courses on the computers starting in the fall of 1988," says Bergum.

As an administrator, Bergum believes his job is to work for the staff and the students. "They (the staff) are the ones who give me advice when I ask questions about what composes a good program. One person can't set up a program," he says.

Bergum also takes responsibility for helping students find jobs before and after graduation. "I try to establish internships so they can get practical experience before graduating," he says.

About a year ago the Schwann's Co. in Marshall, Minn., called Bergum looking for computer science graduates to hire. He recommended two who were interviewed and offered jobs, but both declined. Bergum then encouraged Schwann's to come to SDSU and make a presentation to the Computer Science Club, a move that shortly after landed a different SDSU student a job with the company. "She was a math major with a strong computer science background," says Bergum. Establishing those kinds of relationships can "open doors" for SDSU graduates, he says.

SDSU's Computer Science Department cooperates with industry in other ways. Last year the department offered a computer class to meet the needs of Daktronics, Inc., a Brookings-based manufacturer of computer programmable information display systems. Company management wanted to educate its people in a particular computer language and SDSU was able to meet that need, says Bergum. Daktronics helped set up the class by paying tuition for its

employees and by supplying other funding, as well.

Bergum runs a program that enrolls between 800 and 900 SDSU students each semester. Approximately 75 to 80 of those students are pre-computer science (first-year) majors and 35 to 40 are enrolled as majors. Another 60 to 70 SDSU students seek minors in computer science each year.

Bergum received his bachelor's degree in mathematics from the University of Minnesota and his master's degree in mathematics from the University of Notre Dame. He earned his doctorate in mathematics from Washington State University, Pullman, in 1968. Bergum recently returned to the University of Minnesota to take computer science courses toward a master's degree. Prior to joining the SDSU faculty in 1970, he was a teacher at Arrowhead High School in Hartland, Wis., and a math instructor at Gonzaga University, Spokane, Wash. Bergum was promoted to the rank of full professor at SDSU in 1977.

Bergum addresses math conference, edits international research journal

Dr. Gerald Bergum, head of the Computer Science Department at SDSU, recently gave the featured address at a two-day conference of the North Central Section of the Mathematical Association of America (NCS/MAA) in Bemidji, Minn. His one-hour invited address was entitled "Paths of Decomposition."

The purpose of NCS/MAA is to promote mathematics, says Bergum. The conferences offer a chance for those interested in quality mathematics at all levels to further their knowledge in the field. The region includes all of Minnesota and parts of South Dakota, North Dakota and Canada.

Bergum, a native of St. Paul, has attended 31 of 34 sectional meetings since 1970 and also has attended several national meetings at which he has given about 25, 20-minute presentations.

Bergum, who was chairman of NCS/MAA in 1976-77, recently finished editing the proceedings of a 1986 international math conference held in San Jose, Calif. The proceedings will be published in the *Fibonacci Quarterly*, a mathematics research journal for which Bergum serves as editor. He currently is arranging the next international meeting scheduled for July 1988 in Pisa, Italy.

DESIGNING STUDENTS

SDSU'S FUTURE ARCHITECTS COMPLETE MULTI-DIMENSIONAL PLAN FOR ECONOMIC RESTORATION OF FLANDREAU

Future architects at SDSU are getting a taste of real-world designing. Students in two architecture classes, under the instruction of Bruce Grulke, SDSU assistant professor of general engineering, are completing multi-dimensional plans for the economic restoration of the town of Flandreau.

The "Architectural Systems" and "Community Designs Studio" classes have worked together to provide plans for the community, which they presented to Flandreau in mid-December. And they are plans Flandreau just might use.

Brainstorming for ideas is the job of the systems class, an architecture introduction course composed mostly of freshmen, says Grulke. The designs class is responsible for the actual drawings, he says.

The project began when Grulke was approached by a member of the Flandreau Development Corporation. The group was open to any ideas for the town, says Grulke, so the students started from square one. The organization did suggest, however, that the restoration recreate the spirit of the 1950s, an era of economic boom for the city.

The SDSU students began by compiling an inventory of community resources and studying the history of the community's development. Currently, the students are studying signage and the possible use of buildings now vacated.

The freshmen came up with several ideas for Flandreau, says Grulke, including renovating the train depot, restoring the old Crystal Theater and creating "pocket parks."

The train depot presently is located between two grain elevators. Grulke says renovating the depot into a recreational facility would involve moving the building to the eastern edge of town near the Big Sioux

River. It would provide a hub for many activities including canoeing and hiking, with easy access to the community swimming pool. Its proximity to the retirement center might also make it a place for day-care of children by senior citizens for mothers who want to shop in downtown Flandreau, says Grulke.

The SDSU students' plan suggested that the Crystal Theater be purchased by the school board and be used for school plays and special films.

A touch of New York also found its way into the proposals for downtown Flandreau. Pocket parks, small areas—perhaps located in areas between buildings—fashioned after those in New York City, would provide a place for shoppers to rest, converse or even eat lunch, says Grulke. They mask the noise of the downtown area and possibly even offer recreation, he explains.

To facilitate access to these areas, the SDSU students proposed a two-way shuttle bus system tying the far ends of town to the downtown area. One would reach from the converted depot

to the high school and the other would extend from the Flandreau Indian School to the other side of town where Indian housing is located, says Grulke.

"To increase economic growth, it was our intention to introduce into the town one building that could be used as an incubator for service-oriented businesses, not industries," says Grulke. "The students want the town to draw white-collar businesses which hold, and even share, office space."

The plan also promotes the off-hour use of downtown Flandreau by the self-employed and those starting new businesses, says Grulke.

The Flandreau Development Corporation wanted to find a way to fund the renovation from the beginning, and Grulke says they are now thinking of using parts of, or all of, the propositions.

From left, Matt Aschenbrener, Shakopee, Minn.; Kelly Anderson, Pierre; Kathleen Christensen, Bruce; Brian Begeman, Isabel; James Gillette, Rapid City; and Allan Jansen, Sioux Falls.



Grulke, whose students previously have been involved in designing community plans for Lemmon, Redfield and Brookings, is responsible for developing the pre-architecture program in the General Engineering Department at SDSU. Grulke is

pleased with the opportunities and challenges these projects present to his students.

“The students could design the ultimate retirement home or their dream home with sauna, swimming pool and three-car garage, but why not let them do something that actually might be of use now?” he asks. “This way,” says Grulke, “we’re giving the students a chance, using them as resources and using university facilities for the economic development of the state.”

Bruce Grulke



Future architect Brad Letcher, Mitchell



From left, Laster Rowland, Waubay; Clayton Fejfar, Yankton; Tom Hansen, Sioux Falls; Lyle Murtha, Parkston; Tori Miranowski, Heron Lake, Minn.; and Kelly Engelhart, Watertown.



From left, Kenny Pietz, Parker; Tom Hammerich, Leola; David Anderson, Springfield, Ill.; and Steven Schliesman, Brookings.

PROMOTING

EXPERIMENTAL COURSE GIVES ENGINEERING STUDENTS HANDS-ON PUBLICITY EXPERIENCE

Writing press releases.

Taping public service announcements.

Shooting news photographs.

Sound like topics covered in a typical engineering class?

Probably not, but it was all in a semester's work for 10 SDSU students chosen to participate in an experimental course called "Promotional Techniques for Engineers," first offered during spring semester 1987 by SDSU's College of Engineering.

In April 1987 the SDSU College of Engineering, together with the Governor's Office of Economic Development and the state's Industry and Commerce Association, sponsored South Dakota's first statewide trade fair on the SDSU campus in Brookings. Called IMPACT '87, the trade fair showed the role education plays in enhancing economic development.

What made this effort unique was that SDSU students planned and ran it, doing everything from recruiting 40 exhibitors from across the U.S. to scheduling 30 seminars on topics ranging from economic development to science/technology. "Doing everything" also meant planning a promotional campaign that reached 30,000 citizens across South Dakota and administering a promotional budget that amounted to more than \$18,000.

The promotional techniques class for engineers was begun to teach the students the skills needed to run the promotional campaign for the trade fair. Ernest Buckley, dean of the College of Engineering, admits that it would have been "easier" to turn the planning and promotion over to professionals. "But our business is really education," he says, "and this

kind of class gives students with the best leadership abilities a chance to use them."

MaryJo Benton Lee teaches the course. She owns a public relations consulting firm in Brookings called The Publicity Workshop. She conducts seminars teaching community organizations and businesses to use the media to communicate effectively.

"The biggest communication problem that technical people like engineers have to deal with is that there are many more people who are not technical at all," says Lee. "Technical people communicate well with each other, but they don't do well at all communicating with non-technical people."

"I tell the students the first night we meet to think of themselves not as a class, but as a team," says Lee, "and they do. I encourage the students more experienced in writing and promotion to assist and nurture those less experienced."

The class is limited to ten students each semester. They range from freshmen to seniors. Only the top

students from each of the eight majors comprising the College of Engineering are invited to join the class. Buckley pays their tuition for the class and allows them to meet in his conference room.

The promotions class serves as a recruitment center and training ground for student leaders, says Buckley.

Buckley sees this class continuing "for many more years." Another group of engineering students enrolled in the class fall semester 1987. This group is now publicizing an annual College of Engineering event called Engineering Exploration Days scheduled for March 25-26, 1988.

Michelle Clauson, a junior engineering physics major from Brookings, took the class last year and this year is the promotions chair for Engineering Exploration Days. "After a few months I started to think of the class as a group of friends working together, rather than as a class," she says. "We all had a common goal. We all wanted to succeed."

From left, Scott Youngman, Hecla; Forrest Weston, Sioux Falls; Jim Angell, Elkton, Minn.; and Doug Fick, Luverne, Minn.





MaryJo Benton Lee

Richard Heitkamp, another member of the first class and now president of the Joint Engineering Council, says, "the confidence gained from hours upon hours of experience in using communication skills" was the most important benefit of the class. Heitkamp is a senior civil engineering major from Adrian, Minn.

Lee uses a "hands-on" approach when teaching the course. "The class stresses learn by doing," she says.

Students learn to write for print and broadcast media and to take pictures to accompany news stories. They also learn to work with the media to get their message into print or on the air. Guest lecturers from local media share their expertise with the students. The students have visited the *Sioux Falls Argus Leader* where they toured the plant from newsroom to pressroom and observed a news conference.

For IMPACT '87 the SDSU students assembled more than 100 press kits for distribution to newspapers throughout South Dakota. The students also organized and staffed a newsroom to serve the media covering the event.

The SDSU community also provides enthusiastic support for the promotions class. "Thanks to the work of the class, we were able to release about 30 news stories on IMPACT '87, as well as schedule six radio and television appearances for the students," says Loren Boone, acting director of university relations at SDSU. "This class was a godsend in getting out information to the state's media on a major university event."

The students in the promotional class work side-by-side with the SDSU professional staff as they turn their publicity plans into reality, says Lee. For IMPACT '87, graphic designer Virginia Coudron from university relations helped the class develop a theme and logo which subsequently were used on all the pamphlets, posters, invitations, displays, signs and other promotional items.

SDSU extension radio/TV specialist Emery Tschetter taught students how to get their promotional message

Then they attempt to "sell their program to management," says Lee. In this case, the engineering dean, their professors and fellow students working on the event constitute "management." These people ultimately decide whether the plan the class proposes will be funded.

By this point in the semester, says Lee, the class has learned to make an effective audio-visual presentation. As the final project the class formally unveils its publicity campaign at an



From left, Kevin McLaury, Parkston; Roxanne Alley, Timber Lake; and Carmen Fink, Delmont.

across on television. Then he put the students to the test by interviewing them on camera, running back the tape and critiquing their performances.

After becoming familiar with the details of P.R. work — techniques for using broadcast media, print media, graphic design, photography and advertising —students put their new skills into action planning a publicity campaign for their upcoming event. They develop promotional goals, define publics and select media to use to reach them. Figuring out how to do this within a set budget occupies much of the students' planning time. Finally, the students draft the publicity campaign plan itself and set up a timetable for its execution.

evening reception at the SDSU Alumni Center. The audience asks questions and makes suggestions or accepts the proposal as presented.

Lee says the class also submits a written publicity campaign plan. This means that by the end of fall semester 1987, the second promotions class had a publicity plan already in place for Engineering Exploration Days 1988. Students from both the first and second classes now are working together as the promotional committee for EED 1988 following this plan.

Mary Knudson, a senior mechanical engineering major from LaCrosse, Wis., is the chair for this year's Engineering continued on page 18



SANDER

COLLEGE WORKING
FOR ECONOMIC EXPANSION

Duane Sander

continued from page 17

Exploration Days. She sums up the class this way. "It really taught me to look at the media in a different light. You start to critique the information you receive," says Knudson. "It opens your eyes. Now I really listen."

Students in the fall semester 1987 promotion class included: Roxane Alley, junior in math education, Timber Lake; Jim Angell, senior in agricultural engineering, Elkton, Minn.; Doug Fick, sophomore in electrical engineering, Luverne, Minn.; Carmen Fink, junior in civil engineering, Delmont; Kevin McLaury, junior in civil engineering, Parkston; Sheila Van Sambeek, freshman in math, Milbank; Forrest Weston, freshman in engineering physics and electrical engineering, Sioux Falls; and Scott Youngman, senior in computer science, Hecla.

Froehlich serves as acting head

Dr. Donell Froehlich, SDSU associate professor of agricultural engineering, is serving as acting head of the Department of General Engineering at SDSU.

Froehlich is filling in for Dr. Duane Sander who is serving as acting dean of the College of Engineering. Sander will resume his position as department head when Dean Ernest Buckley returns from working with the Office of Economic Development for Gov. George Mickelson. Buckley has been on leave at the state office since June 1987.

Froehlich joined the SDSU faculty in 1985. He earned his bachelor's and master's degrees from SDSU in 1972 and 1973, respectively. He received his Ph.D. degree from Cornell University in 1976.

It has been a very fast year for me as acting dean since Dean Buckley went on leave in June to work with Governor Mickelson. Reading Dean Buckley's article in this Impulse, you see that his resourcefulness and his dedication to South Dakota shine through in the programs he is developing and helping establish. It certainly does show an upbeat and optimistic future for South Dakota.

Meanwhile, back at the ranch, the College of Engineering continues to develop its capabilities to share and help in this exciting economic expansion. We are working on a proposal to develop a computer center which can be accessed by small industry to utilize the power and capabilities of a large computer. The costs will be on a use basis.

Our research internship program is being finalized, and we are pursuing a number of research opportunities through the Engineering and Environmental Research Center under the direction of La Dell Swiden. He has been writing and critiquing proposals from staff throughout the engineering college.

There will be a challenge in fall 1988. We will be visited by the Accreditation Board of Engineering and Technology, Inc. (ABET), examiners who will review our Electrical Engineering, Civil Engineering, and Mechanical Engineering Departments for accreditation. We also will be seeking reaccreditation of our Engineering Physics program which has been strengthened through redesign and the addition of qualified staff with advanced degrees. We feel we are ready for the demanding review by ABET. Overall, these reviews require that each department examine its purpose, goals, program, and its related staffing and equipment. We will be concentrating on these reports throughout the spring semester.

We appreciate your interest and help as we strive to improve SDSU's College of Engineering. Please stop in when you come to Brookings.

Duane Sander, acting dean of engineering



Don Froehlich

ENTREPRENEURS

AWARDS PROGRAM ENCOURAGES SDSU STUDENTS TO DEVELOP BUSINESS IDEAS

The idea for Federal Express earned a C and a "too far out" verdict when its founder first presented the plan for the company to a business class. He's now the owner of one of America's most popular methods of nationwide, overnight delivery service.

SDSU students also can move their business ideas into the realm of reality through the Entrepreneur Awards Program, now accepting entries for the second year's contest. Applicants will prepare a plan that outlines a new South Dakota manufacturing, processing or service business that can grow to employ at least 15 people by the end of its third year of operation.

The Entrepreneur Awards Program is sponsored by Daktronics, Inc., a Brookings-based company that is awarding \$500 to the first place winner and \$250 to second place. Dr. Aelred Kurtenbach, president of

Daktronics, says the program encourages individuals to plan and organize business ventures that could realize a profit and improve employment figures in South Dakota.

Kurtenbach, one of Daktronics' two founders, says that if a person does not have the conviction to push an idea through, it "will die on the vine." Daktronics put down its roots in 1968 in 250 square feet of space. It now has about 300 employees in a 64,000-square-foot plant and is a leader in the manufacture and international marketing of computer programmable electronic information displays. The company is supplying scoreboards for the 1988 Winter Olympics at Calgary in Alberta, Canada. Dr. Duane Sander, acting dean of the SDSU College of Engineering, was co-founder of the company and is now secretary on the Daktronics' board of directors.



Aelred Kurtenbach

The Entrepreneur Awards Program will help students plan ahead, says Kurtenbach. "You have to have enough self-control to take a risk," he says. "There's a lot of detailed effort required to get it (a plan) accomplished."

To compete in the Entrepreneur Awards Program applicants must be undergraduate or graduate students at SDSU. The business idea entered should be in a business plan format.

Entrepreneur award entries must be delivered to the Office of the President, Administration Building, Room 222, by 5 p.m., March 23.

Entries will be judged by members of the SDSU Entrepreneur Committee. Finalists will be required to deliver an oral presentation to the judges. All entries will receive written critiques.

ASSESSMENT

SDSU'S ENGINEERING FRESHMEN ARE ABOVE THE NATIONAL A.C.T. AVERAGE

Sophomores in SDSU's College of Engineering displayed a significant increase in ACT scores after two years of education at SDSU.

SDSU freshmen engineering students averaged 24.2 on their ACT composite score which is higher than the regional, state or national scores for engineering students.

On the national level, freshmen engineering students scored 3.2 points lower than SDSU engineering students. The average change in ACT scores for SDSU engineering students between their freshman and sophomore years of education increased nearly one point. SDSU

engineering students showed the most significant increase in ACT math scores, where the average increased nearly two points.

The assessment program is a result of the Board of Regents' acceptance of the recommendations of the statewide assessment committee. The results, as organized by SDSU's assessment program team, focus on four distinct areas including ACT test scores, entering freshmen surveys, exiting senior surveys, and admissions marketing. These four areas provide critical information on the curriculum review, admissions marketing, quality of university life and accreditation.

Test and survey results help determine what kind of education South Dakota's students receive and investigate students' attitudes regarding themselves, their education and the world around them.

Members of the SDSU committee that analyzed assessment results are Kris Smith, institutional assessment coordinator, Dr. Randy Hyman, assistant dean of student affairs; Dr. Doug Malo, professor of plant science; Mary Schmiesing, assistant professor of economics; Dr. Gary Steinley, associate professor of education; and Dr. Ron Stover, associate professor of rural sociology.

PIERSON

THIS 'DESIGNING STUDENT' IS PLANNING THE PROPOSED ADDITION TO SDSU'S ALUMNI CENTER



Chris Pierson

What started as a general elective, three-credit class has become a real-life architecture project for SDSU student Chris Pierson.

Pierson, a junior civil engineering major from Claremont, is designing a proposed addition for the SDSU Alumni Center, under the supervision of Bruce Grulke, a licensed architect and assistant professor of general engineering at SDSU.

Pierson's interest in architecture began when he enrolled in Grulke's "Architectural Design Drafting" class. The goal of this course, which has since become "Contract Documents," is to introduce students to graphic standards and data retrieval systems necessary for computer-assisted drafting.

At the same time Pierson was in the course, planning for an addition to the existing Alumni Center was in the preliminary stages. The alumni staff was looking for someone to draft plans and contacted Grulke.

Pierson saw a challenge and since then has been working with the staff at the Alumni Center to interpret their ideas for the addition by putting them into drawings. He says he has met with them many times and changed his plans to meet their needs.

Pierson's proposal for the addition includes a first level, which would be 1,400 square feet, and a second level which would be 1,700 square feet. The addition, still in the preliminary stages, would accommodate staff of the development office and alumni association, according to Walt Conahan, director of development and the SDSU Foundation. The addition would also provide an area for the phonathon center and social functions.

Pierson has been responsible for presenting his ideas and drawings to various committees. He says this has greatly enhanced his speaking abilities. "It's given me a real insight on how things will work when I graduate."

The actual designing work, under Grulke's supervision, has proved to be invaluable experience. "It gives me very, very good experience. I feel that I'll have a jump on 90 percent of the students when I graduate because of this real experience," Pierson says.

This project has increased Pierson's interest in school, as well. "It's made

me more anxious to graduate, so I study harder. I want to learn all this material," he says.

Grulke would like to see more students in positions such as this. "They know what they're doing, but they need to be out working with people," he says.

According to Grulke, there are economic advantages for students working on projects such as this. These include reducing the student debt ratio, and offering the students hands-on experience while reducing the cost to the client. Since students do the work, a much smaller fee is charged, but the work is still the quality of a professional's because he, as a licensed architect, supervises everything, says Grulke.

As the Community Design Program grows, Grulke hopes more professionals—both architects and engineers—will become involved. This program would allow professionals to undertake projects in communities where the funding is insufficient. "Everyone would benefit," says Grulke. "There would be more student opportunities. Communities that are not presently being served would be receiving professional attention and the professionals would increase their exposure."

Pierson, a junior at SDSU, hopes to continue designing buildings and working with clients after he graduates. "This is my first experience of this sort," he says, "but it definitely won't be the last."

SDSU offers a pre-architecture program under Grulke's direction. At present interested students can take a variety of courses including "Contract Documents," "Community Design Center," "Synchronus Systems," "Architectural Systems," "Architectural Design Studio," and "Micro-Computers in the Design Profession."

SDSU's Tompkins Alumni Center may get an addition designed by pre-architecture student Chris Pierson.



BIERMAN

SDSU STUDENT SPENDS SUMMER WORKING FOR ASTRONOMY OBSERVATORY

Greg Bierman, engineering physics and electrical engineering major at SDSU, "listened" to stars, galaxies and planets last summer while he worked at the National Radio Astronomy Observatory (NRAO) in Socorro, N.M.

Bierman, from Aberdeen, was appointed to the student program of the NRAO located in Socorro. His job was to work with Dr. D.S. Bagri testing electronic systems for the Very Long Baseline Array (VLBA), a form of the Very Large Array (VLA) located 50 miles outside Socorro.

The Very Large Array is a set of 27 antennas, each of which resembles a satellite dish, says Bierman. These radio telescopes are each 85 feet across and are placed in the shape of a Y on the plains of New Mexico.



Greg Bierman

They pick up radio frequency signals from stars, galaxies and planets. The antennas may be placed close together or up to 13 miles apart depending on what is being observed. The signals are then studied and the information is recorded, he says.

Scientists can determine composition and size of objects in outer space by using the VLA, says Bierman. For example, the VLA can pick up signals from the absorption and emission of radiation in dust clouds. Using this information, the size, content and distance of the cloud can be determined.

The function of the VLA is not, however, to look for life in outer space, says Bierman. One instructor told him, "If we happen to see something, we'll report it, but that's not what we're here for."

Bierman's individual project was to work with the VLBA. He says this is similar to the VLA, but will be organized differently. Instead of 27 antennas placed close together, 10 antennas will be placed in different locations across the United States.



Warren Hein

These 10 will simulate an antenna as wide as the United States. The results will not be as clear as with the VLA, but they will be able to observe much greater distances, he says.

Testing for the VLBA is progressing and Bierman helped test the electronic receivers for the new antennas. The main emphasis was to see if the phase, or signals, would change under different climatic conditions. Cables which would carry the signals were put in sealed rooms and exposed to extreme temperature changes. Bierman says they found the phase did not change much, so no corrections needed to be made.

When he applied for the position, Bierman was doubtful about getting it. His grade point average and references probably were factors, he says, but the operator just happened to need an electrical engineering major. Bierman thought he would be working mainly in the astronomy field. He was glad to find out he would be using his academic majors in the testing process.

Sixteen students from around the U.S., Europe and Australia participated in the program. Bierman says each student had a separate project to work on during the summer and they also attended lectures.

Dr. Warren Hein, head of the Physics Department at SDSU, says Bierman is the first SDSU student he knows of who has gotten the appointment. "It's a very exciting opportunity to work in a high tech area and get paid very well. It's an honor to be chosen," says Hein.

Bierman, a senior at SDSU, plans to join the Air Force after graduation. He is the recipient of a four-year Air Force Reserve Officer Training Corp Scholarship.



HEITKAMP

INCREASED VISIBILITY IS GOAL OF JOINT ENGINEERING COUNCIL

The Joint Engineering Council (JEC) has been working hard this year to achieve its goal of increased visibility.

The activities of the council fall mainly into two parts. The first semester is used to re-establish and update members after the summer break and to complete the chapter's minor projects. The second semester is devoted to three major projects: Phonathon, Experience '88 and Engineering Exploration Days.

This year, to keep engineering students and the technical societies informed about the JEC's activities, the minutes of its biweekly meetings are distributed to the society advisers and posted in the new JEC information cases at each end of Crothers Engineering Hall. Upcoming meetings and events also are posted there.

In December, the JEC created a display for the engineering hall with pictures of the technical society representatives to the council. Since the JEC is the governing body of the engineering college, it is open to input and ideas from both faculty and students, who should be able to identify council members from the various technical societies.

SDSU's student chapter of The National Society of Professional Engineers (NSPE) has established an office in the engineering hall, as a home for records, as the base for current activities and to increase the chapter's visibility on the SDSU campus.

The JEC also has voted to amend its constitution and include a new representative from Brown Hall's engineering floor.

Another principle goal of the council is to promote professionalism in engineering education at SDSU. Wednesday of each week is designated as "Professional Dress Day." Students, especially seniors, are encouraged to dress in a professional manner for their engineering classes that day. This is an important part of a student's informal education and displays to the university the seriousness with which the engineering students pursue their degrees.

The planning for the major spring projects is well underway. The newest of the three programs is Experience '88. Michelle Clauson, JEC vice president, has set out to increase the number of students and companies participating.

New goals have been set for this year's phonathon and the spring exposition. Jim Angell is chair of the phonathon and Mary Knudson is chair of the EED. The hard work of the committee is sure to make these goals a reality.

Richard Heitkamp, president
JEC and NSPE student chapter

SDSU students attend conference

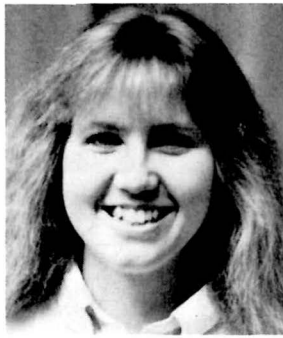
Three SDSU engineering students recently attended the Fourth Annual National Engineering Student Council Conference at Columbia University in Manhattan, N.Y.

Mary Knudson, LaCrosse, Wis., Richard Heitkamp, Adrian, Minn., and Susan Quam, Burnsville, Minn., were among 200 delegates who discussed ways to strengthen their leadership skills and become more effective communicators in their respective engineering fields.

The delegates, representing more than 50 engineering schools throughout the country, participated in workshops, seminars and roundtable discussions on the topics of motivation and achievement of their goals as engineers.

EXPERIENCE '88

EXTERNSHIPS GIVE STUDENTS A LOOK AT CAREERS



Michelle Clauson



Jim Angell

SDSU engineering students can find out exactly what industries do through Experience '88, an engineering externship program.

Students participating in the program spend one week during spring break with professional engineers, says Richard Heitkamp, a senior civil engineering major from Adrian, Minn., who is Joint Engineering Council (JEC) president and Experience '88 organizer. He says SDSU's student JEC chapter began this program last year to "provide insight into job opportunities and serve as a necessary link between the engineering education and career alternatives."

Michelle Clauson, senior engineering physics major from Brookings, is JEC vice president and Experience '88 coordinator. She says the experience students receive varies. Most students are assigned to follow an engineer for one week and watch what is done. Because there is no teaching involved, credits cannot be set for the program, says Clauson.

Experience '88 will give students a chance to see the field of work they want to go into. Seeing what other engineers do on the job, she says, will help students decide if that is the right line of work for them.

Not only will students understand the job better, they also can make connections with potential employers. "It would give them an edge on the job market," Clauson says. Some companies may like the person they worked with during that week and may be interested in that person after their graduation.

Heitkamp says Experience '88 is based on a similar program at Southern Illinois University where industries volunteer to spend time with a student for a week, and the industries provide housing if possible.

One of SDSU's goals for this year is to

have more industries involved, Heitkamp says. JEC also wants to include more companies involved in electrical engineering and engineering physics to make the Experience '88 program more balanced with civil and mechanical engineering industries now participating.

Clauson says another goal is to begin contacting companies earlier and to get more students involved. Last year, she says, there were more industries than students available, and JEC wants to balance the number. So far, 10 industries and 8 students are interested in the SDSU program for Experience '88 during spring break.



Carmen Fink

PHONATHON

ALUMNI TELEPHONES WILL BE RINGING IN FEBRUARY

The fifth annual SDSU Engineering Phonathon to raise money for equipment and scholarships is set for Feb. 15-18.

"We're hoping this year's Phonathon will be the best one yet," says event chair Jim Angell, senior in agricultural engineering from Elkton, Minn. "But, we're going to need the full support of all alumni in order for this to happen," he says.

Donations generated by the phonathon benefit the dean's engineering fund unless otherwise specified by the contributors, says assistant event chair Carmen Fink, a junior from Delmont. Sometimes donations take the form of job leads, she says. The phonathon also gives current students a chance to tell alumni what's happening at SDSU, and "we as students enjoy talking to alumni to find out what they do," says Fink.

The four-night phonathon begins around 6 p.m. each evening, says Angell. There are two, two and a half hour shifts, each with about 70 student callers. A phonathon committee including students and faculty from all the College of Engineering departments coordinates everything, he says, including publicity, workstations and mailings. This year's faculty co-chairs are Charles Tiltrum, associate professor of civil engineering, and Teresa Hein, instructor in physics.

Angell says an advance mailing about the 1988 Phonathon is being sent to all SDSU engineering alumni.

"One of our 1988 phonathon goals is to get 100 per cent participation. Any pledge, small or large, is important to the College of Engineering," says Angell.

JEC

SDSU'S JOINT ENGINEERING COUNCIL ELECTS OFFICERS, NAMES ORGANIZATIONAL REPRESENTATIVES

Richard Heitkamp, Adrian, Minn., is president of the Joint Engineering Council at SDSU for the 1987-88 academic year. Other officers are Michelle Clauson, Brookings, vice president, and Susan Quam, Burnsville, Minn., secretary.

Heitkamp is a junior civil engineering major. He is a member of Sigma Alpha Epsilon Fraternity, American Society of Civil Engineers, Society of American Military Engineers, and the SDSU speech team and serves as president of the SDSU chapter of the National Society of Professional Engineers. He is a recipient of a full Army ROTC scholarship.

Clauson is a junior engineering physics major. She is a member of Staters for State and the National Society of Professional Engineers and serves as president of the SDSU Society of Physics Students. She is also a member of Tau Beta Pi engineering honor society and Mortar Board academic honor society. Clauson is involved in the SDSU honors program and is a recipient of the four-year Stephen Briggs Scholarship.

Quam is a junior electrical engineering major with minors in computer science and math. She is active in the Institute of Electrical and Electronic Engineers, Eta Kappa Nu and Chi Omega Sorority.

The purpose of the Joint Engineering Council (JEC) is to represent the College of Engineering at SDSU. It is composed of representatives from all student engineering organizations on campus and also serves as the student chapter of the National Society of Professional Engineers.

Representatives serving on the JEC from the Computer Science Department include junior Majdi Sweidan, Brookings, and senior Chris Thompson, Flandreau. Math Department representatives are sophomores Jenny DeYoung, Sioux Falls, and Roxane Alley, Timber Lake; junior Toni Vondra, Rapid City, and senior Pam Janklow, Sioux Falls.

PHYSICS

SDSU STUDENT GROUP NAMED ONE OF NATIONAL OUTSTANDING CHAPTERS

The SDSU chapter of the Society of Physics Students (SPS) is one of 30 out of 542 in the country to be designated "Outstanding SPS Chapters for 1986-87."

The awards recognize student chapters for their work in the promotion of physics. Chapters were judged on their activity as demonstrated through regular meetings, on-campus faculty and student speakers, films, SPS social events and chapter membership. The chapters also were judged on SPS Allied Award and Marsh W. White Award proposals submitted, awards granted, student papers presented at SPS and other scientific meetings, students' attendance and participation in SPS zone or regional meetings and hosting of SPS zone or regional meetings. SPS members at SDSU completed a summary report about the chapter which was evaluated for the award.

Last year's officers were Marcia Kruse Tunheim, president, from George, Iowa; Terry Harmes, vice president, Chester; and Michelle Clauson, secretary-treasurer, Brookings. Officers for 1987-88 are Clauson, president; Paul Neth, vice president, Scotland; and Denise Tveidt, secretary-treasurer, Brookings. Dr.

Warren W. Hein and his wife Theresa are SPS advisers at SDSU.

The Society of Physics Students is a national student organization with more than 7,500 members in collegiate chapters in the U.S. and Canada. It is part of the American Institute of Physics.



From left, Terry Harms, Chester, last year's vice president; and current SPS officers Michelle Clauson, Brookings, president; Denise Tveidt, Brookings, secretary-treasurer; and Paul Neth, Scotland, vice president.



Susan Quam

The American Society of Mechanical Engineers is represented by juniors Chuck Runge, Hartford, and Damon Pistulka, Fairfax, and senior Mary Knudson, Sioux Falls.

The Institute of Electrical and Electronic Engineers is represented by Quam; freshman Kelly Harty, Lesterville; sophomore Stacy Helmann, Rapid City; and juniors Mark Westerman, Chancellor, and Leland Day, Onida.

Representatives from the American Society of Civil Engineers are Heitkamp, senior Mark Mayer, Sturgis, and junior Carmen Fink, Delmont. The Society of Physics Students is represented by Clauson and freshman Eric Moser, Lake Preston.

Freshman Tom Roemen, Aurora, and junior Jon Becker, Pierre, serve as representatives for the American Society of Certified Electrical Technologists. Seniors Jim Angell, Elkton, Minn., and Paul Funk, Fulda, Minn. are representatives for the American Society of Agriculture Engineers.

Junior Robert Schrunk, Marshall, Minn., represents the Brown Hall engineering floor. Sophomore Yeow Teong Than, Brookings, represents the Malaysian Student Association. Senior Tom Froseth, Garretson, represents the American Society of Heating, Refrigeration and Air Conditioning Engineers.

SDSU's College of Engineering enrolls more than 1,200 students majoring in civil, mechanical, electrical and agricultural engineering. In January 1987, the SDSU College of Engineering earned the top Professional Development Award for excellence from the 77,000-member National Society of Professional Engineers.



ENGINEERING EXPLORATION DAYS

ENGINEER YOUR FUTURE

High school students and SDSU engineering alumni are invited to participate in Engineering Exploration Days (EED), sponsored by the SDSU College of Engineering, March 25-26.

High school students can explore the opportunities offered by the College of Engineering, and college students can take a look at the opportunities offered by companies participating in EED, says event chair Mary Knudson, senior in mechanical engineering from LaCrosse, Wis.

Co-chair Damon Pistulka, junior mechanical engineering major from Fairfax, says committees planning EED include students from the Joint Engineering Council, the technical societies and those who were involved with IMPACT '87, as well as several faculty advisers.

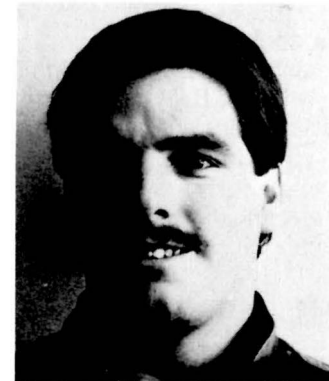
Knudson says the event will begin Fri., March 25, with the high school programs. Students will participate in contests and seminars focused on engineering and incorporating technical or professional topics.

An awards ceremony Friday evening will recognize College of Engineering students for their achievements. This will be followed by the annual distinguished engineer banquet, where the dean will honor alumni for their professional accomplishments, says Knudson.

Saturdays's activities will begin with contests and seminars for college students. The Trade Fair featuring industry and student displays will be open to the public both Friday and Saturday in Frost Arena of SDSU's HPER Center. Pistulka says the student booths will be design and demonstration projects developed by those students. The industry booths will display their products and services, recruit graduating seniors and educate the general public on the manufacturing techniques of their companies.

Engineering Exploration Days will run simultaneously with Little International and the Home Economics Exposition, says Knudson, as all three target the same primary audience, high school students.

For more information on the trade fair or the distinguished engineer banquet, call the SDSU College of Engineering at (605) 688-4161.



Damon Pistulka



Mary Knudson

SCHOLARSHIPS

SDSU'S ENGINEERING STUDENTS BENEFIT DURING 1987-88 ACADEMIC YEAR

BRIGGS SCHOLARS

Five freshman in the College of Engineering have been awarded the prestigious Stephen F. Briggs Scholarship, the largest academic award offered at SDSU.

It is a \$1,500 scholarship renewable for four years if the recipient maintains a 3.0 grade point average on a 4.0 scale. The 10 scholarships are divided into two groups with five given to engineering majors and the other five open for students in any major.

The scholarships are given in honor of the late Stephen F. Briggs, a 1916 graduate of SDSU and inventor of the Briggs and Stratton engine. The \$1,500 award covers approximately one semester of college each year. A total of 40 Briggs Scholars, 10 in each class, are provided scholarships at SDSU each year.

Freshman recipients are Cindy Berens, Sioux Falls; Matthew Brey, New Richland, Minn.; Matthew Kurtenbach and Thomas Mittan, Brookings; and Jay Munsch, Yankton.

Berens has a double major in engineering and physics and a minor in computer science. Brey has a double major in mathematics and engineering. Kurtenbach and Mittan are majoring in electrical engineering. Munsch is majoring in electrical engineering and minoring in computer science.

AMDAHL WINNERS

Four freshman in the SDSU College of Engineering have received Amdahl Scholarships for the 1987-88 academic year.

Steve Ashton, from Sioux Falls, is majoring in math and minoring in engineering. He received a \$100 Amdahl Scholarship, as well as the \$450 Eggers Steel Co./Wayne Peters Scholarship.

Marianne Blume, Brookings, received a \$300 Amdahl Scholarship. She is

majoring in mathematics at SDSU. Andrew Edeburn, also from Brookings, is majoring in electrical engineering. He was awarded the \$200 Amdahl Talent Scholarship, as well as the \$200 Laverne Noyes Scholarship.

Loren Knutson, Platte, has been awarded a \$300 Amdahl Scholarship. He is majoring in electrical engineering and minoring in computer science.

AG ENGINEERING

Fourteen students have been awarded scholarships by the Agricultural Engineering Department at SDSU for the 1987-1988 academic year. The scholarships were awarded on the basis of grade point average, leadership qualities, high moral character and sincerity of purpose in the recipient's chosen field of study.

Receiving \$100 scholarships were Kent Klemme, LeMars, Iowa; Kent Perkins, Claremont; Steven Schemm, Valentine, Neb.; and Bradley Schmidt, Dell Rapids.

Chad Lee, DeSmet, and Jeff Schultz, Montivideo, Minn., received the Aaron Schaible Award.

The Henry Delong Scholarship was awarded to James Ketelhut, Pukwana, and Thomas Oppold, Sioux Falls.

Individual scholarship winners included Todd Shippy, Colome, the Marvin Larson Scholarship; Craig Andre, Pierre, the Dale McDowell Memorial Scholarship; Peter Bendorf, Turton, the Dennis L. Moe Scholarship; Jim Angell, Elkton, Minn., the \$750 Ralston Purina Scholarship; and Timothy Skaar, Hayard, Minn., the \$500 Gehl Scholarship.

CLARKSON AND NELSON

Blake Anderson, Platte, and Robert Anderson, Sioux Falls, are attending the 1987-88 academic year at SDSU on freshmen scholarships. Blake received the \$250 Clarkson Scholarship, named

for Herbert W. Clarkson, a South Dakota rancher and businessman who established a \$50,000 student loan program at SDSU in 1948. Blake is majoring in mechanical engineering and minoring in civil engineering. Robert was awarded the \$250 Nelson Scholarship. He plans to major in civil engineering.

LARSON MANUFACTURING

Brian Rudie, a civil engineering major from Belgrade, Minn., is one of five freshman at SDSU to be awarded the \$1,000 Larson Manufacturing Building Trades Scholarship for the 1987-88 academic year.

The Larson scholarships are provided each year for incoming freshmen whose parent or parents are engaged in the building products industries as manufacturers or as wholesale or retail distributors. The scholarships are made possible by an endowment program established through a gift to SDSU in 1985 of \$50,000 worth of Larson Manufacturing Co. stock from Dale Larson, president of the company.

3M and others

Recipient of the \$500 3M Scholarship included National Merit Scholars, Kathleen Coyle, Box Elder; Brian Steward, Chelsea; and Daryl Scholfield, Pierre.

Other engineering students receiving 3M scholarships include Troy Anenson, Chowchilla, Calif.; Timothy Beck, Wilmont, Minn.; Jeffrey Ihnen, Round Lake, Minn.; Mark Peterson, Huron; Anthony Rieder and Robin Schneider, Sioux Falls; and Robert Schrunck, Marshall, Minn.

Danial Buysse, Minneota, Minn., received the \$300 Kearns Scholarship. The \$250 Crothers Scholarship winners were Mathew Dewitte and Tom Hansen, Sioux Falls. Tracy Steiger, Glenham, was awarded the \$550 William Gamble Scholarship.

CIVIL ENGINEERING

Seven SDSU civil engineering students received scholarships recently at the annual banquet of the student chapter of the American Society of Civil Engineers (ASCE).

Clair Budahl, senior from Sioux Falls, received the Kearns Machinery Scholarship, as well as the Chi Epsilon Scholarship.

Craig Genzlinger, a senior from Maple Plain, Minn., was awarded the Minnesota Public Works Association Scholarship. Genzlinger is this year's president of the SDSU chapter of Chi Epsilon, the national civil engineering honor society.

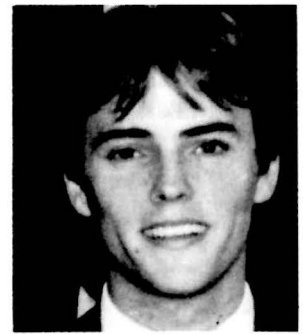
Phil Jorgenson, a graduate student from Hampton, Iowa, and Brian Clow, a senior from Brandon, were recipients of the John R. Anderson Scholarship for the 1987-88 academic year. Jorgenson, whose graduate work is in water resources and pollution control, received an \$800 award. He currently is a part-time operator at the Brookings advanced wastewater treatment plant. He graduated from SDSU in 1984. Clow, who received a \$200 award, has maintained a good academic standing while working two part-time jobs, one of which also is part-time operator at the Brookings wastewater plant. Clow was outstanding sophomore civil engineering student in 1985-86.



Clair Budahl



Brian Clow



Craig Genzlinger



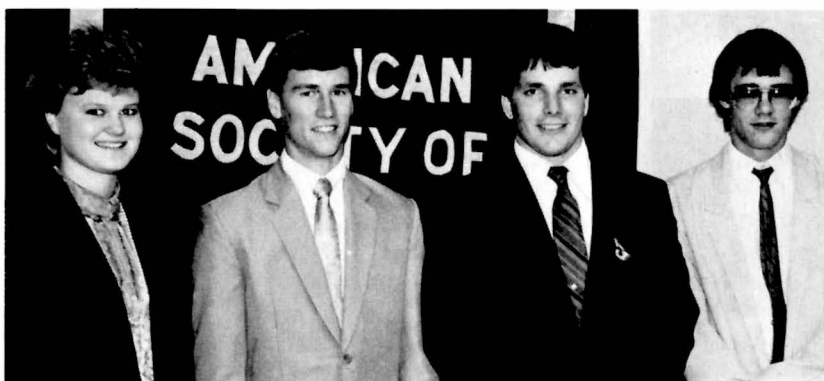
Phil Jorgenson

Three students received the Associated General Contractors (AGC) Highways Scholarship. They are Carmen Fink, a junior from Delmont; Kevin McLaury, a sophomore from Parkston; and Lee Roadifer, a junior from Newell. Fink is assistant chair for this year's engineering phonathon. McLaury also was honored as outstanding sophomore in civil engineering.

Outstanding civil engineers honored

Four students earned outstanding student awards at the annual banquet of SDSU's chapter of the American Society of Civil Engineers (ASCE) recently. Kristin Yahnke, Sherburn, Minn., was named outstanding freshman. She is also the secretary of the ASCE. Kevin McLaury, Parkston, received the outstanding sophomore

award, as well as the AGC Highways Scholarship and the Chi Epsilon Scholarship. Dan Niehus, LeMars, Iowa, was named outstanding junior and was initiated into Chi Epsilon honor society. He is also the corresponding secretary for the ASCE. Chris Lawrenson, Beresford, received the outstanding senior award.



Outstanding civil engineering students, from left, freshman Kristin Yahnke, Sherburn, Minn.; sophomore Kevin McLaury, Parkston; junior Dan Niehus, LaMars, Iowa; and senior Chris Lawrenson, Beresford.

AGC Highways Scholarships recipients, from left, Lee Roadifer, Newell; Carmen Fink, Delmont; Jim Keyes, AGC executive director from Pierre; and Kevin McLaury, Parkston.

STUDENT OFFICERS

ASCE

Mark Smith, a senior from Agar, recently was elected 1988 president of SDSU's student chapter of the American Society of Civil Engineers (ASCE). Other officers include Diane Rossow, senior from Mankato, Minn., vice president; Kristin Yahnke, sophomore from Sherburn, Minn., secretary; Mark Mayer, senior from Sturgis, treasurer; and Dan Niehus, junior from LeMars, Iowa, corresponding secretary. SDSU's student chapter of ASCE was founded in 1903. Associate professor Charles Tiltrum is the adviser.

ASAE

New president of the SDSU student chapter of the American Society of Agricultural Engineers is Thomas Oppold, a junior from Sioux Falls. Other officers are John Appelen, a senior from Canby, Minn., vice president; Kent Klemme, a sophomore from LeMars, Iowa, secretary; and Steven Schemm, a sophomore from Valentine, Neb., treasurer.

Advisers to the student chapter are Gary Anderson, assistant professor, and Don Froehlich, associate professor, both in SDSU's Agricultural Engineering Department.

PI TAU SIGMA

Lyle Johnson, a senior in mechanical engineering from Sibley, Iowa, has been elected president of Pi Tau Sigma, mechanical engineering honor society for students at SDSU. Other Pi Tau Sigma officers are Lonnie Pederson, Sisseton, vice president, and Scott Zoellner, Sioux Falls, secretary-treasurer.

Clayton Knofczynski, professor of mechanical engineering, is Pi Tau Sigma adviser.

CHI EPSILON

New officers for Chi Epsilon, the national civil engineering honor society at SDSU, have been selected for 1988, with Craig Genzlinger, senior from Maple Plain, Minn., as president. Other officers include Diane Rossow, a senior from Mankato, Minn., vice president; James Bedessem, a senior from Brandon, secretary-treasurer; and Scott Schneider, a senior from Ipswich, marshall.

IEEE

Mark Ekse, a senior from Sioux Falls, is newly elected president of the student chapter of the Institute of Electrical and Electronic Engineers (IEEE) at SDSU.

Other officers include Tracey Olson, a senior from Agar, vice president; Stacy Helmann, a sophomore from Rapid City, secretary; and Doyle Trankel, a junior from Toronto, treasurer.

Student chapter adviser at SDSU is Ramzi Sawaya, instructor in electrical engineering.



1988 Chi Epsilon officers, from left, secretary-treasurer James Bedessem, Brandon; marshall Scott Schneider, Ipswich; vice president Diane Rossow, Mankato, Minn.; and president Craig Genzlinger, Maple Plain, Minn.



Chi Epsilon 1988 initiates, from left, Ron Gillen, White Lake; Swee Hoe and Chin Lim, Brookings; and Dan Niehus, LeMars, Iowa.

CONTRIBUTORS to the Greater State Fund from June 2 to Nov. 30, 1987

Support from alumni has come to be essential to institutions of higher education. Contributions have made possible the developmental 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 achievement.

BENEFACTORS (Gifts of \$1,000 or more)

Hassan S. Ghazi, professor and head of the Mechanical Engineering Department has provided funds for equipment acquisition in his department.

Nancy Wilz Haselhorst, wife of the late Donald D. Haselhorst, formerly president and chief executive officer of Nicolet Instrument Corporation in Madison, Wisconsin, made a grant to the Electrical Engineering Department for equipment.

Wilton E. McKown, BSEE, 1953, made a significant contribution to the scholarship he has established in the College of Engineering. He had a long career as an engineer with Western Electric (now AT&T Technologies) on military-support projects.

Jacqueline Skill Thielen, wife of the late Lawrence R. Thielen, BSEE 1950, founder, chairman of the board and chief executive officer of Avontek, Inc., Palo Alto, Calif.

The Helen Tschurr Estate left a substantial bequest to the Dr. Raymond Reinhart scholarship fund which was established by Dr. Gene Amdahl.

Irene L. Wentz, professor emeritus of mathematics, has established a scholarship endowment for math and is financing the scholarship with her annual gifts.

SENIOR CENTURIONS OF THE SECOND CENTURY (Gifts of \$200 to \$999)

| | | |
|---|---|---------------------------|
| 1947 Olson, Gordon W. & Dorothy | 1967 Cannon, Michael & Sandra | 1983 Bocklund, Lori S. |
| 1948 Chamberlin, Charles H. | 1975 Currie, David W. Van Orman, Roy E. | 1986 Foss, Polly K. |
| 1965 Olson, Robert C. Schrag, Robert J. | 1976 Wittig, Timothy A. | |

ENGINEERING CENTURIONS (Gifts from \$100 to \$199)

| | | |
|--|---|--|
| 1938 Vick, Maurice R. & Lenore | 1955 Douglas, Loren L. | 1974 Christianson, Leslie & Linda |
| 1939 Larson, Lorys J. | 1957 Isaak, Merlyn & Faye Marten, Gene A. | 1976 Strandell, William J. Trygstad, Joan S. |
| 1940 Emmerich, James C. Olson, Ernest C. | 1959 Nelsen, Gary L. & Janet Yocom, Albert L. | 1980 Determan, Mark C. Neuse, Gerald A. |
| 1942 Buckwalter, Carole | 1960 Lucke, Keith A. | 1981 Krueger, Sally |
| 1947 Waltz, Wayne W. & Ruth | 1965 Kurtz, David & LaVonne | 1983 Clemen, William J. |
| 1948 Endahl, Lowell J. & Vronna Trapp, Lansford E. | 1971 Mettler, Earl R. | 1985 Lee, Irene K. |
| 1950 Bertram, August H. | 1972 Moshier, Clarence & Ida Serlet, Timothy D. | Friends Menshing, Scott Yocom, Kenneth L. |
| 1951 Halverson, Harley L. | | |

ALTRUISTIC ALUMNI (Gifts up to \$99)

| | | |
|--|---|--|
| 1931 Yost, Light B. | 1963 Genzlinger, Vern T. Kuhlmann, Dennis W. Trimble, Vernon L. Wiedenman, Douglas | 1977 Ferguson, Robert E. Schultz, Bradley & Laurie |
| 1932 Basford, Shirley | 1964 Dunning, James A. | 1978 Bente, Frederick W. Card, Bruce W. Schoeneman, Loren & Wanda Schuelke, Greg A. Tetzlaff, Connie R. |
| 1934 Grothem, Frederick W. | 1965 Klos, Kenneth C. Konechne, Norman L. Moshier, Thomas W. Woods, Thomas M. | 1979 Patera, John & Ginger |
| 1936 Bonell, John A. Sauder, Harlow L. | 1966 Cason, Gary E. Greve, Robert P. Klosterbuer, James A. Page, Edward | 1980 Arbach, Steven C. Johnson, Alan & Marlys |
| 1942 Arms, Milo F. | 1967 Hauge, Paul S. & Sandra | 1981 Ralston, Dana M. & Jinna R. Rayman, Daniel J. Van Zweden, John |
| 1944 Randall, Bruce & Lucille | 1968 Johnson, Charles L. | 1982 Duvall, Ronald J. Sahebjam, Khanbaba & Barbara Thoreson, Kelly D. |
| 1948 Anderson, Marilyn & Joe Reynolds, Laverne E. Roberts, Leslie & Wanda Whitney, Robert A. | 1969 Aamold, Carroll E. Eichel, James L. Tschakert, Carol | 1983 Berndt, Roy W. Bruning, William J. Claeys, Arnold P. Cleveland, Lee D. Pochardt, Paul |
| 1949 Hurley, Jeanne Knabach, Wayne E. Lundquist, Charles A. Stern-Montagny, Francis Thomas, Loyl R. & Helen | 1970 Alsaker, Vincent & Myla Caldwell, Gordon M. Hoekman, Earl B. Shea, Le Roy D. | 1984 Harberts, Kristi Kay Isakson, Julie M. Lewandowski, Jeff A. Mack, Todd J. Pederson, Daniel & Barbara Schat, Brian D. |
| 1950 Christianson, Ken & Doris De Sart, Dean A. Vincent, Thomas G. | 1971 McLaughlin, Thomas & Connie Swift, Mrs. Scott S. Vick, Paul S. | 1985 Albright, Joel N. Aldebeki, Hussam Roshdi Lee, Kyle E. Palm, David A. Price, Gregg S. Van Ommeren, Ryan K. Vortherms, Kenneth A. |
| 1951 Anderson, Charles S. Schlumpberger, Leroy & Barb | 1972 Jensen, George A. | 1986 Klaassen, Daniel R. Peterson, Randy N. Schauae, Curtis L. |
| 1952 Ice, Lawrence L. Loen, Orlin K. Raymond, Robert T. | 1973 DeWit, John Heibult, Robert A. Knabe, Douglas & Tanis Oakland, Steven F. Uhrich, Earl W. | 1987 Resen, Jane E. |
| 1956 Monahan, Maurice & Patty Peppers, Norman A. | 1974 Dreesen, Charles J. Kennedy, Donald H. & Donna Russell, Larry E. Wodworth, Greg A. & Edna | Friends Bryn, Milo F. Ewing, John M. Hein, Warren & Teresa Herron, Doug Worth, Thomas S. |
| 1957 Audeh, Nadeem F. Mann, Jack L. Nelson, Philip H. | 1975 Beason, Thomas B. Carlson, Stanley & Gwendolyn Duffy, Gary J. Gabel, Dale D. Mattke, Dummley L. & Sally Melstad, James D. Pellegrini, Katherine R. Stevens, Larry & Debbie Wheeler, Rodney D. | |
| 1958 Berg, Robert & Sharon Ditman, Albert C. & Theima Franzen, Kermit W. Leary, J. Pat Sabisch, Kenneth A. Stribley, Gary E. Weaver, William A. | 1976 DeMers, Larry D. Lein, Steven & Cynthia | |
| 1959 Gehring, Glenn S. Hansen, Curtis D. Kane, Martin M. Larson, Alvin R. Lundberg, Barry D. Paine, David L. Warfield, Duane R. | 1960 Byers, Lora Furubotten, James & Joyce Hendrickson, Bruce A. Olsen, James F. & Arline | |
| 1961 Benson, Ralph A. Buseman, Jerald M. Colby, Allen C. Cornelius, James Daniels, David D. Nagelhout, Maynard & Sharon Nixon, Robert K. Schofield, Jerald D. Wieman, Marvin D. | | |
| 1962 Ankrum, Charles A. Lingo, David P. & Shirley McConkey, LeRoy Swiden, LaDell & Phyllis | | |

DORNBUSH & LARSON

SDSU HONORS ALUMNI FOR DISTINGUISHED SERVICE



James Larson

Two engineering alumni have been honored by the SDSU Alumni Association as Distinguished Service Award winners. They are James Dornbush, Brookings, and James Larson, St. Louis, Mo.

Dornbush and Larson were among five recipients cited for their outstanding achievements, at a banquet Oct. 2 during homecoming weekend at SDSU. The Distinguished Service Awards are given annually.

Dornbush, a professor of civil engineering, was recognized for



James Dornbush

his outstanding service to SDSU. He was graduated in 1949 with a degree in civil engineering, earned his master's degree from the University of Minnesota and his doctoral degree from Washington University. Dornbush has served on the SDSU faculty for more than 30 years and is co-founder of SDSU's graduate program in water resources and pollution control. He also is president of Dorand Engineering, Inc., a consulting firm.

Larson currently serves as the senior project manager and chief geotechnical engineer at Sverdrup in St. Louis, where he supervises staffs on projects involving major bridges, tunnels, marine facilities, environmental systems and buildings. He was honored for outstanding professional achievement. Larson received a degree in civil engineering from SDSU in 1951.

RITTERS

HE DOUBLES AS COM

Fred Rittershaus has two careers. In civilian life he's the senior principal project manager for a consulting engineering and architectural firm. In his military life he's a brigadier general in the South Dakota Air National Guard.

Rittershaus says juggling two careers demands an extra commitment of both time and energy. It's a real test of management skills. As the assistant adjutant general for Air at the South Dakota Air National Guard Headquarters in Sioux Falls, he advises and assists the adjutant general with all activities of the Air National Guard units assigned to South Dakota. He devotes at least one weekend a month to the Air Guard, as well as 20 to 30 active duty days throughout each year. The rest of the time he's a professional consulting engineer.

SDSU engineering alumnus Dean Ernest Buckley stands in the presence of those who inspired his career in civil engineering. Professor Emory Johnson, center, who headed the Civil Engineering Department for more than 30 years, welcomed his former colleague Calvin C. Oleson for a 1987 visit to the SDSU campus. Oleson was on the SDSU staff before World War II and returned for a year after the war. He had a long career with the Portland Cement Assoc. and was named a distinguished SDSU engineering alumnus in 1976. Oleson is now retired at 11026 Meade Drive, Sun City, Ariz. 85351.



HAUS

SULTING ENGINEER AND BRIGADIER GENERAL

The SDSU alumnus launched his engineering career 32 years ago as a field engineer during summer breaks. He earned a bachelor's degree in 1958 and then his master's degree in 1962, both in civil engineering. He served on the SDSU engineering staff as an assistant professor until joining Banner Associates, Inc., full time in 1964.

After more than 25 years of specialized engineering experience with Banner Associates, Rittersshaus is now vice president and a member of the firm's board of directors. With headquarters in Laramie, Wyo., and offices in Mesa, Ariz., Grand Junction, Colo., and Rapid City, as well as Brookings, Banner is one of the largest architecture/engineering firms in the Rocky Mountain region. It has provided services for more than 2,000 projects in the western U.S., ranging from small, local projects to complex, multi-disciplinary projects for clients, including private and public utilities, government agencies, industrial and commercial firms and private individuals.

Rittersshaus works out of the firm's Brookings office as senior principal project manager. He specializes in all phases of structural design, hydraulics,

water and wastewater treatment facilities. In addition to his engineering work in the environmental area, he has broad experience in transportation, including both multiple highway and urban street projects and airport improvement projects. It's here that his dual careers have proved mutually beneficial. His Air National Guard duties have provided Rittersshaus with first-hand airport and base facility experience at Joe Foss Field in Sioux Falls, as well as at other Air Force bases in the U.S., Panama, Puerto Rico and Germany.

Rittersshaus started his military career even earlier. A year out of high school, 35 years ago, he enlisted in the Air National Guard. He spent a year in the U.S. Air Force Aviation Cadet program and then rejoined the Guard as an enlisted aircraft jet engine mechanic. In 1959 Rittersshaus was commissioned a second lieutenant, initially serving as an air installation construction engineering officer. He then became a civil engineering officer and base civil engineer. He completed extensive military schooling and when the 114th Civil Engineering Flight was organized and federally recognized in 1969, Rittersshaus was appointed its first commander. In 1981 he was assigned as the civil engineering staff officer at South Dakota Air National Guard Headquarters and assumed his present position as assistant adjutant general in 1986. He was promoted to the rank of brigadier general in 1987.

Banner Associates employs more than 100 engineering, architect, and specialized professionals. "We hire a diverse staff," says Rittersshaus. "That allows the firm the flexibility to form multidisciplinary teams selected for their ability to handle the unique challenges presented by a particular



Fred Rittersshaus

project." He says SDSU's College of Engineering is an excellent recruiting source. About 15 to 20 Banner professionals are SDSU graduates, Rittersshaus estimates. These include majors from several engineering disciplines, as well as the other sciences. Of the 12 professionals presently in the Brookings office, 11 are SDSU alumni.

Rittersshaus says the firm also hires SDSU engineering undergraduates on summer work programs, intern/externship programs during the summer and occasionally during the school year. "It's beneficial for both the students and Banner. The students are getting on-the-job experience working beside practicing professionals, and the firm is getting better than average employees," Rittersshaus says.

Rittersshaus' two sons currently are enrolled at SDSU. John is a junior in civil engineering and William is a freshman in electrical engineering.



THE WILD HARE

SORD AIRPLANE BECOMES SPIRIT OF SDSU ENGINEERING

Like the Spirit of St. Louis, the Wild Hare is the spirit of SDSU's College of Engineering. The experimental airplane is the result of three years of design and construction work by students in the college's Student Originated Research and Design (SORD) program.

Certified pilot Troy Meink, a senior in mechanical engineering from Lemmon, put the Wild Hare into the air for its maiden flight in December. Several perfect takeoffs and landings and a few aerial maneuvers were enough to prove to Meink that "it handles very well."

In addition to Meink, the construction crew who finished the plane included mechanical engineering students Paul Huls, a senior from Avon, Minn.; Reese Kor, a freshman from White; Faron McFarland, a freshman from Brookings; Don Sanderson, a senior from Conde; Steve Turner, a 1987 graduate from Glenham; and Scott Zoellner, a senior from Sioux Falls. Turner is now a NASA-sponsored

graduate assistant in aeronautical engineering at George Washington University. He directed the ultralight airplane design activity for two years.

Dr. Hassan Ghazi, head of the Mechanical Engineering Department at SDSU, says the Wild Hare was an all-engineering project with contributions from all disciplines.

The single passenger, 370-pound plane is powered by a 28 horsepower Rotax engine, which Meink describes as "basically a snowmobile engine." That and the seat from a dune buggy are the only ready-made parts in the airplane, he says.

The plane can cruise at 60- to 70- miles per hour and uses two to three gallons of fuel. With a five-gallon fuel capacity, that gives the Wildhare a projected range of about 150 miles, says Meink.

According to Ghazi, the materials for the plane cost about \$5,000. The



Troy Meink

Student-built experimental airplanes, the Wild Hare, left, and the Kolb Ultrastar, right.

engine was \$1,800. The project was financed by private donations.

Meink says the goal of this SORD project is to develop an airplane farmers can use for personal flights, as well as remote control crop spraying. There are plans to add to the electronic system to make the Wild Hare a dual-purpose aircraft. The plane also could carry cameras for mapping or could be used as a remote sensing device to check fields for the necessity of irrigation or the effects of pest infestation.

Meink says that while most of the plane's design incorporates previously used techniques, the fuselage is original and the remote spray appliance with wing tanks will be an innovation. The construction team expects to have a remote spray system with an approximate 40-acre capacity in operation by next summer. "We're shooting for the airshow in Oshkosh in July," he says.

In consideration of possible commercial production of the aircraft, Meink says, "We figure we could sell it with the spray system for under \$10,000."

Dean Buckley quotes SDSU's distinguished engineering alumnus Gene Amdahl, to describe the success of the SORD Wild Hare project: "Minds set free can fly."



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