

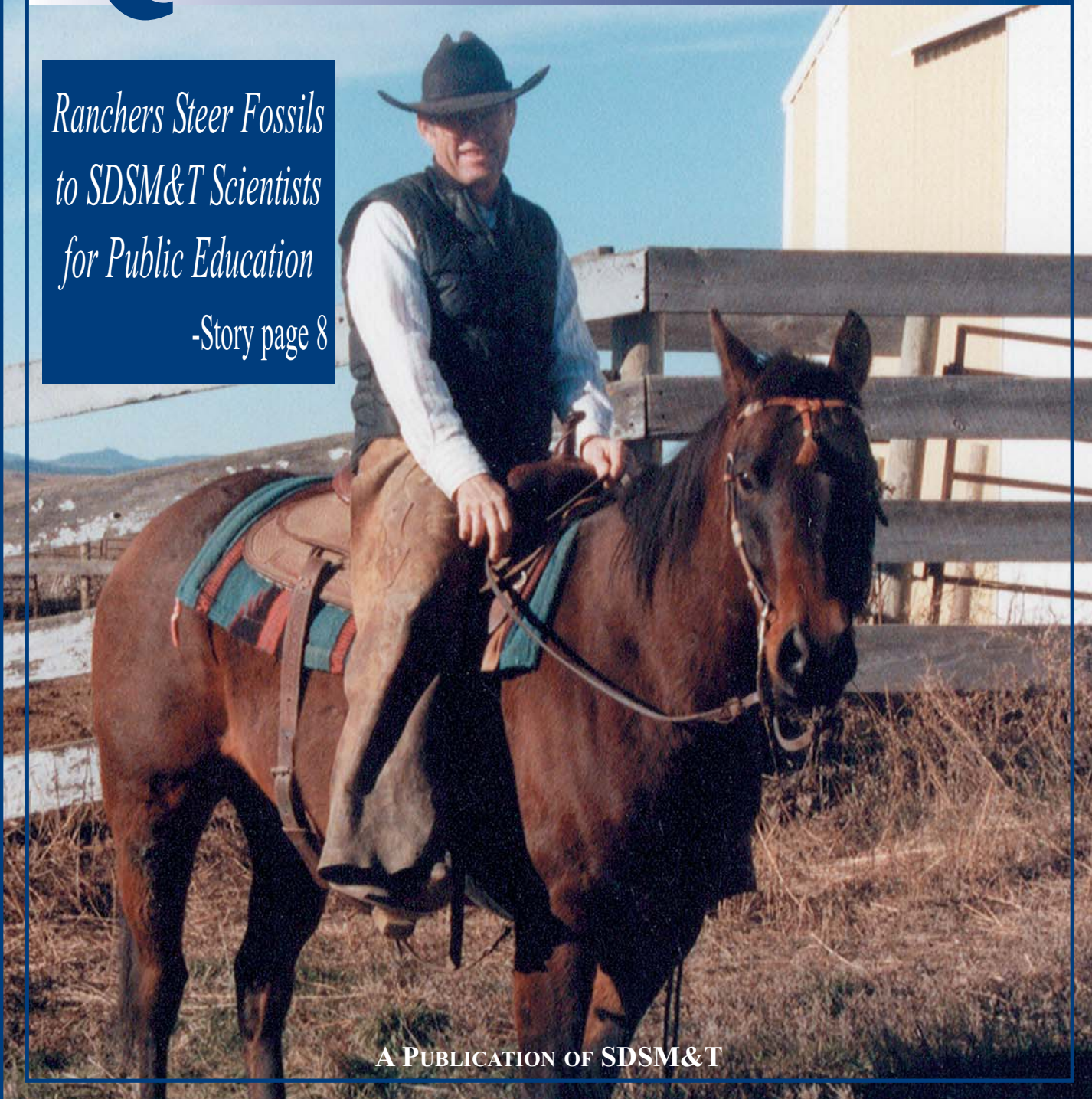
QUARTERLY

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY

WINTER 1999

*Ranchers Steer Fossils
to SDSM&T Scientists
for Public Education*

-Story page 8



A PUBLICATION OF SDSM&T

Perspectives



Dear Friends,

SDSM&T has a long history of providing math, science and technology outreach services to children of all ages. In December the South Dakota Board of Regents and the Rapid City Common Council entered into a joint agreement that will provide for a hands-on children's museum year round in Rapid City.

The Children's Science Center will provide for educational programs for the general public, children, families and school groups. The Center will also serve as a resource for area teachers.

The Children's Science Center will be located in the City's Halley Park building, which for many years housed the Sioux Indian Museum and the Minnilusa Pioneer Museum. Many of the exhibits from the SDSM&T Museum in Motion, which for the past decade has been open on campus only during the summer months because of space constraints, will be refurbished and moved to the Halley Park facility.

The City has made the facility available and now we are looking for businesses, organizations, families, and individuals to join with us as sponsors for exhibits and programming activities at the Children's Science Center. Your support will provide the resources necessary to expand the interactive displays and establish educational programs for children and teachers. Exhibits will provide hands-on educational experiences in earth science, physical science, technology literacy, space science and biological science.

The Children's Science Center is scheduled to be available for classroom field trips and the general public beginning in April of 1999. With your support, we can provide our youth with the educational experiences they need to become leaders in the high tech careers of tomorrow and in businesses that can provide the future economic strength for our state. For more information regarding this exciting new community endeavor, call our Office of University and Public Relations at (605) 394-5146.

Best wishes for good health and happiness in 1999.

Sincerely,

Richard J. Gowen
President

QUARTERLY

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY
Winter 1999

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CAMPUS

Profile

The South Dakota School of Mines and Technology, founded in 1885, has been a national leader in preparing world-class engineers and scientists. Our graduates design, construct, and operate modern technology to meet complex challenges such as global warming, health care delivery, energy resource development, mineral extraction and processing, environment quality, futuristic transportation, and national defense. Our alumni are held in the highest regard by their fellow leaders in industry, consulting, government, health and education.

Tech has diversified to meet the needs of engineering and science throughout the world. South Dakota Tech's intellectual environment was shaped a century ago by the ingenuity and rugged individualism of pioneers in science and technology. Tech's present day pioneers provide inspiration and remain on the cutting edge in the fields of engineering and the sciences.

ACADEMIC PROGRAM: SDSM&T is a state-assisted university providing graduate and undergraduate degrees in science, engineering, and interdisciplinary studies.

BACHELOR OF SCIENCE DEGREES

Chemical Engineering	Industrial Engineering
Chemistry	Interdisciplinary Science
Civil Engineering	Mathematics
Computer Engineering	Mechanical Engineering
Computer Science	Metallurgical Engineering
Electrical Engineering	Mining Engineering
Geological Engineering	Physics
Geology	

MASTER OF SCIENCE DEGREES

Atmospheric Sciences	Materials Engineering and Sciences
Chemical Engineering	
Civil Engineering	Mechanical Engineering
Computer Science	Paleontology
Electrical Engineering	Technology Management
Geology and Geological Engineering	

DOCTORATE OF PHILOSOPHY DEGREES

Atmospheric, Environmental and Water Resources
Geology and Geological Engineering
Materials Engineering and Sciences

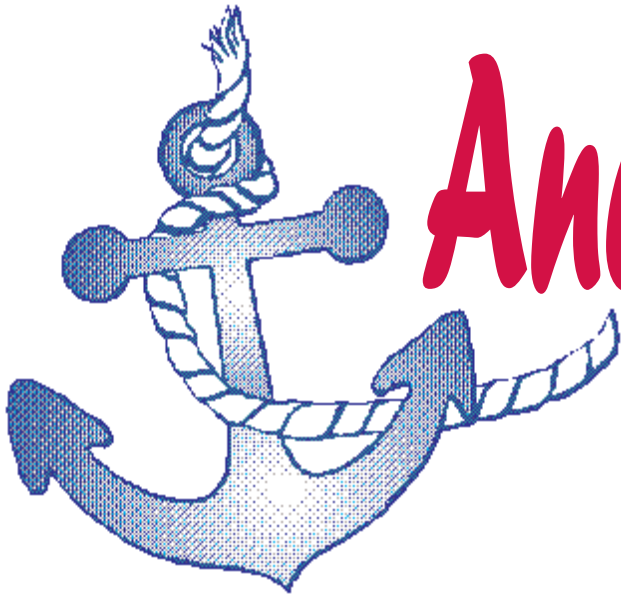
ENROLLMENT: The University has a diverse enrollment of approximately 2,200 students from nearly 30 states and 20 countries. Our 13 departments offer 30 degree programs in engineering and science disciplines at the baccalaureate, masters, and doctoral levels. Students enter the university with the highest ACT composite in the state and more than half graduating within the top 25 % of their high school.

COSTS AND FEES: Annual undergraduate costs for tuition, fees, room and board total less than \$8,000 per year for residents of South Dakota, Alaska, Colorado, Hawaii, Idaho, Minnesota, Montana, Nevada, New Mexico, North Dakota, Oregon, Utah, and Wyoming. Annual total costs for all other undergraduates is less than \$11,000 per year.

RESEARCH: High quality research is conducted in departments and in our research institutes.

FACULTY: There are approximately 100 faculty with degrees from more than 150 institutions, eighty five percent of which have earned doctoral degrees.

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Anchors Away

Civil Engineering professor provides expertise for mobile navy base

The closest that South Dakota Tech comes to having its own Navy is a couple of concrete canoes on Canyon Lake! Nevertheless, research being conducted on this university campus in land-locked South Dakota connects SDSM&T to the U.S. Navy of the 21st century.

Dr. Sangchul Bang, Dean of the College of Earth Systems and Professor of Civil & Environmental Engineering, is spearheading a research team at SDSM&T that is developing design technologies to help build huge floating naval bases. Under a contract awarded by the Office of Naval Research, Dr. Bang and his research team are studying the mooring technology necessary to anchor such giant floating structures in deep waters.

The innovative Mobile Offshore Base (MOB) concept involves building a self-propelled ocean megastructure that could be

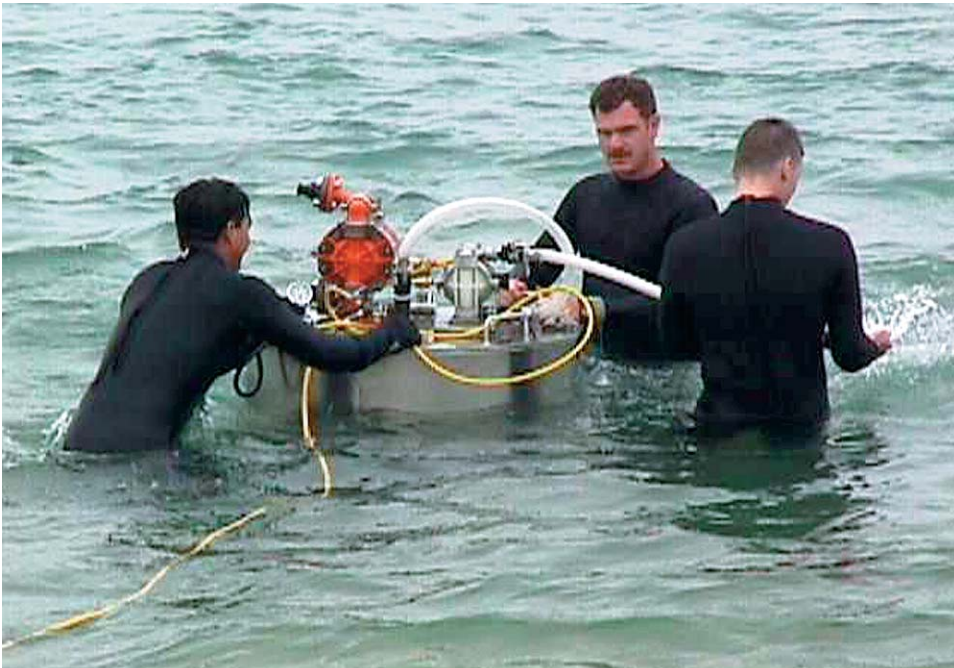
deployed around the world to protect the military and security interests of the United States. As the difficulties increased for renewing fixed land base lease agreements with other countries overseas, Navy officials decided to study the feasibility of the MOB idea. When the feasibility studies are completed and the design technologies are fully developed, implementation of the MOB program will have far-reaching implications for U.S. national security interests and military capabilities.

In essence the MOB would be a floating airport with a runway one mile long and 400 feet wide on which the Air Force's new C-17 transport planes could land and take off! The C-17 plane, which uses a heavy and short runway, is the type of aircraft that was utilized to transport the whale of "Free Willy" fame to Iceland a few months ago.

"This structure would be five times longer than the current Nimitz class aircraft carrier," explains Dr. Bang. "The largest floating structure built to date is a crude oil tanker that is 1500 feet long. The MOB would be 3 1/2 times longer and would weigh 1.7 million tons."

In addition to handling the C-17 transport planes, the MOB also would be able to accept cargo from MSC Container ships, have 3 million square feet of reconfigurable internal storage space, and hold 10 million gallons of fuel. The floating naval platform would have several decks underneath designed to accommodate 3,000 troops—the equivalent of an entire Army or Marine heavy brigade. The MOB would be designed to accommodate flight, maintenance, supply and other forward logistics naval support operations being conducted.

Regardless of the MOB design concepts, such a heavy and huge ocean structure will require extremely strong mooring devices that can reach 10,000 feet deep down to the ocean floor. In addition, the MOB anchoring system must possess the strength and flexibility to withstand not only the deep-water pressures but also the



Jeff Thomason (far right) joins Navy divers at the Naval Facilities Engineering Service Center in Port Hueneme, CA to conduct small-scale field testing on suction piles.

Photo courtesy of Dr. Bang

Dr. Terje Preber, Professor of Civil & Environmental Engineering, and Dr. Sangchul Bang, Professor of Civil & Environmental Engineering, prepare clay samples to simulate the ocean floor with the help of students (l to r) Yeongki Cho, Darin Hodges, Yvonne Starostecka and Jeff Thomason.

hurricane-strength forces of Mother Nature.

Conventional types of foundations and installation methods cannot be applied because of the deep water and extraordinarily large loads that are expected as part of the floating base concept. Dr. Bang has proposed a unique approach for the anchoring of a floating base. The Office of Naval Research (ONR) awarded him a \$346,400 grant to study the feasibility of installing very large suction piles in deep-water locations by applying suction pressure remotely within the pile. September of 1999 is the target date for completion of Dr. Bang's 2½-year research project for the Navy.

The suction piles needed to anchor MOB's could be as large as 100 feet in diameter! They would be installed by applying negative (suction) pressure to create a vacuum that would result in the pile being sucked down into the ocean floor. Retrieving the pile, which is crucial to the concept of a mobile floating base, is accomplished through positive pressure that pushes the pile up from the seabed.

Dr. Bang has been conducting tests on 3-foot suction pile models in the lab on the SDSM&T campus. His research team includes Dr. Terje Preber, Professor of Civil & Environmental Engineering; two undergraduate students—Darin Hodges (CEE senior, Sturgis)

and Yvonne Starostecka (CEE junior, Rapid City); and three graduate students—Jeff Thomason (MS, CE, Rapid City); Yeongki Cho (Ph.D., MES, Korea); and Heuisoo Han (Ph.D., MES, Korea).

Graham Smith (BS GeolE '96; MS CE '98), who now works for the South Dakota Department of Transportation Research Office, also worked on the project while pursuing his graduate degree in civil engineering.

Dr. Preber has supervised the laboratory testing of the models. Last October Drs. Bang and Preber presented the first findings of their tests at the Canadian Geotechnical Engineering Conference in Edmonton,

Canada. Several more technical presentations will be made in 1999.

Dr. Bang and Jeff Thomason traveled to California last September to conduct small-scale field testing at the Naval Facilities Engineering Service Center (NFESC) in Port Hueneme, CA. Thomason donned a wet suit and joined Navy divers in testing suction piles that were three feet wide. The field tests went as planned. Additional testing of larger models that are five feet in diameter is planned for the near future.

Using clay samples that have been designed and prepared to simulate the ocean floor, the

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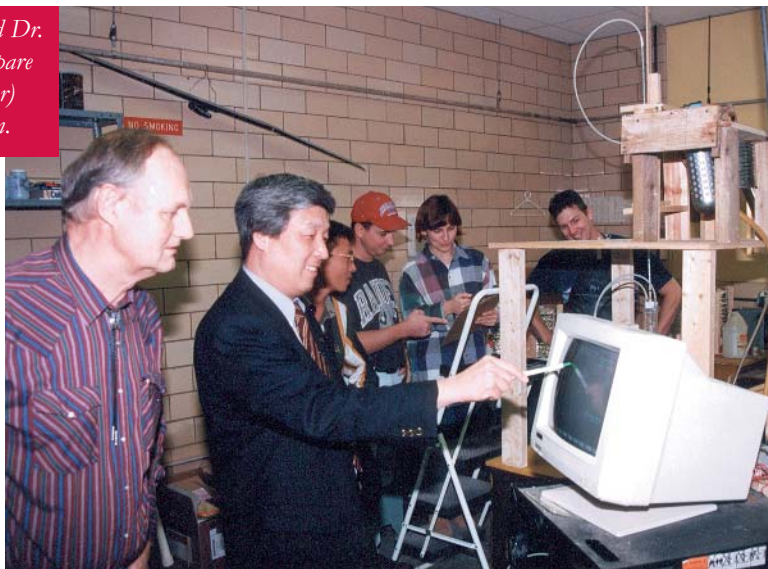


Photo by Darrell Sawyer

The MOB would be a floating airport with a runway one mile long and 400 feet wide on which the Air Force's new C-17 transport planes could land and take off! It would be able to accept cargo from MSC Container ships, have 3 million square feet of reconfigurable internal storage space, and hold 10 million gallons of fuel. The floating naval platform would have several decks underneath designed to accommodate 3,000 troops—the equivalent of an entire Army or Marine heavy brigade.



Kvaerner Maritime (Seabase Inc.)

This flexible bridge module is one of the overall design concepts that has been proposed for the Mobile Offshore Base.

Image source: MOB web site (<http://mob.nfesc.navy.mil/AlternativeConcepts/>)

Britton Business Booms

South Dakota company provides rapid prototyping for businesses across the country

Brett Myklegard shows Dr. Richard Gowen, SDSM&T President, one of the prototypes produced by ProTECH.

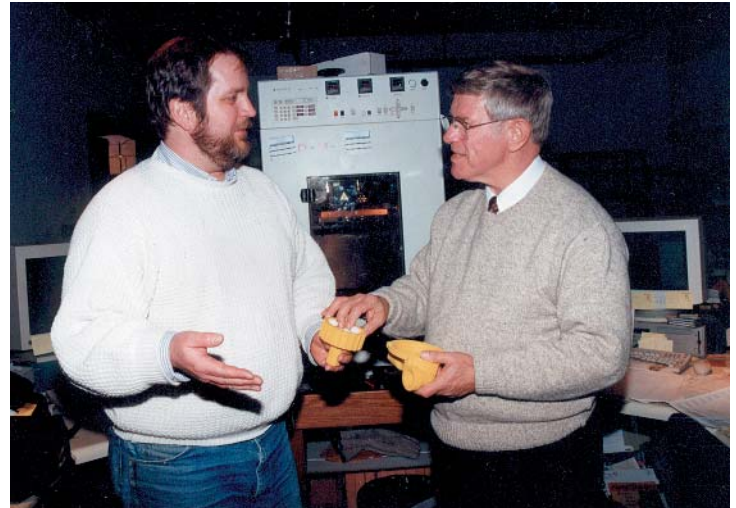


Photo by Julie Smorgoniewicz

Many SDSM&T students go to work for South Dakota businesses and agencies immediately upon graduation. Many others who must leave the state to find jobs in their fields return in a few years as soon as career opportunities become available.

Some of these SDSM&T alums come back to South Dakota and start their own businesses. Mark Wismer (EE '78) and Brett Myklegard (ME '85) exemplify that entrepreneurial spirit. Three years ago these two engineers started their own company called ProTECH Engineering and Manufacturing in Britton, SD. The company specializes in rapid prototyping, urethane casting and engineering consulting work related to all aspects of product design and development.

ProTECH does business with a wide range of companies—such as Cleveland Golf Clubs, Marvin Windows, Melroe, Rainbow Vacuum Cleaners and Polaroid Corporation. ProTECH Engineering's showpiece is the rapid prototyping equipment called Stratasys, which takes computer-generated solid models and produces free-form plastic parts for various companies. Starting with a flat foam base, the Stratasys equipment extrudes semi-molten plastic with a thickness of only .007 - .014 inches into specific parts needed by ProTECH's customers.

High-speed, quality Internet connections are vital to ProTECH Engineering's operation, which

demonstrates that a company can be based in rural South Dakota and conduct business around the world through advanced telecommunications technology. Brett Myklegard estimates that approximately 90% of the company's work utilizing the rapid prototyping equipment is derived over the Internet.

For example, Melroe Company engineers may design a new part and will put out a request for bids to have a prototype made. Wismer and Myklegard will download the design off the Internet or receive it via email. They often will send the company back a quote within one hour.

"Speed is the nature of the game," says Myklegard in describing the significance of the Internet to their business. "In the prototype world, everyone wants it right now."

In fact, good Internet service is so crucial to the success of their business that Wismer and Myklegard have established an Internet connection for the community. Working with RapidNet in Rapid City, they now provide dial-up networking services for Britton areas businesses and residents.

After graduating from SDSM&T with a mechanical engineering degree, Myklegard, who is a native of Milbank, worked for a large aircraft company in California. Wanting to move back to South Dakota, he took a job with a company in Britton. His future business partner, Mark Wismer, who earned a Bachelor of Science degree in electrical engineering from SDSM&T in

1978, also was working for the same company. A few years later, they decided to take the entrepreneurial plunge and start their own venture.

"There is no question that my degree from South Dakota Tech made this all possible," says Myklegard. "It would have been impossible to start this company without the degrees we have and our diverse background of experiences."

Like most other start-up companies, lining up the necessary financing was a key component to getting ProTECH Engineering established. The Northeast Council of Governments (NECOG) played a vital role in that effort. Through a special start-up loan fund operated by NECOG, Wismer and Myklegard were able to purchase the Stratasys machine, a desktop mill, and some computer workstations.

Remembering their South Dakota Tech roots, Wismer and Myklegard also are helping their alma mater's Solar Motion Team. Last spring ProTECH made a prototype scale model of the solar car that SDSM&T students are designing and building for the Sunrayce '99 competition. By

Mark Wismer displays a free-form plastic part produced by the Stratasys equipment.

donating their prototyping services and technical expertise, Wismer and Myklegard are helping the solar team members stretch their limited budgetary resources.

SDSM&T's students are preparing to race their Dakota Heat solar car this summer against some of the nation's best engineering universities that have much larger enrollments and significantly higher budgets. Companies or individuals interested in providing technical or financial assistance to SDSM&T's Solar Motion Team should contact Ken Harding (EE senior, Newell) at (605) 394-2213.

"It is good to see the increased focus being placed on entrepreneurial thinking at SDSM&T," says Mark Wismer. "This is a necessary part of any engineering education, especially for individuals who have any inclination to start their own business like we did."

The company has come a long way in a relatively short period of time. ProTECH Engineering and Manufacturing now has business clients all over the country from coast to coast. Additional information about the rapid prototyping capabilities and product design services can be obtained electronically via the company's web page at www.prototypes.com or by calling (800) 893-7939.


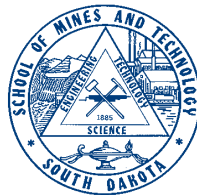
Utilizing the quality education and training in cutting-edge technology they received from SDSM&T, Wismer and Myklegard exemplify the many alumni who help power South Dakota's economic engine. Their leadership and entrepreneurial spirit provide positive proof that it is possible to achieve the win-win situation of living in South Dakota and doing business for companies anywhere in the world. 



Photo courtesy of Mark Wismer

PRESIDENT GOWEN APPOINTED TO WEB-BASED EDUCATION COMMISSION



SDSM&T President Dr. Richard J. Gowen recently was appointed by U.S. Senator Tom Daschle to the newly created Web-Based Education Commission. The establishment of the commission was authorized in the Higher Education Act of 1998 passed by Congress and signed into law last October.

The 14-member commission will conduct a thorough study of the educational software currently available for secondary and post-secondary education and will hold public hearings in each region of the country. The commission members will submit a report to the President and Congress outlining their findings and recommendations on how the classroom use of Internet-based technologies can be enhanced.


"I look forward with great excitement to the opportunity to work with other members of the commission in developing new educational tools available through the Internet and the World Wide Web," said Dr. Gowen.

"Through these and other new technologies, we are at the threshold of providing individualized education so that all citizens may reach their potential for a lifetime of success."

"The capabilities for the enhancement of teaching and learning that are now available through the Internet hold promise for a new era of education in our nation's

schools, universities, businesses and homes," he added. "We are now within reach of providing the education that will truly offer each individual the equal opportunity that was the vision of our nation's founders."

"Dr. Gowen is a national leader in the improvement of math and science education," stated Senator Daschle. "He has made a lifelong commitment to helping students achieve success. He has worked to make computer technology an indispensable part of every educational program, and he has championed successful partnerships between government, industry and universities."

U.S. Senator Bob Kerrey of Nebraska was Senator Daschle's other appointee to the commission. 



"I look forward with great excitement to the opportunity to work with other members of the commission in developing new educational tools available through the Internet and the World Wide Web," said Dr. Gowen. "Through these and other new technologies, we are at the threshold of providing individualized education so that all citizens may reach their potential for a lifetime of success."

NSF Grant

Supports

Undergrad

Research

The caliber of research opportunities for undergraduate students has reached a new level at SDSM&T. The National Science Foundation (NSF) awarded a grant last year to Dr. Robb Winter, R.L. Sandvig Professor of Chemical Engineering, to operate a Research Experience for Undergraduates (REU) Site on the South Dakota Tech campus.

With the institution's designation as an REU Site for Engineering, SDSM&T joins the ranks of some very prestigious and significantly larger universities—Notre Dame, Clemson, Cornell, Princeton, University of Minnesota, Northwestern University and Georgia Tech, to name just a few. South Dakota Tech is one of 43 different universities throughout the United States that are currently funded by NSF as REU Sites for Engineering.

The \$333,476 grant awarded to Dr. Winter will be utilized over a five-year period to support undergraduate research concentrated in the area of "Molecular Level Modification of Surfaces." The REU site at SDSM&T has the following goals: 1) provide undergraduates in chemical engineering or allied fields with unique and exciting research opportunities in the area of molecular level surface modification; 2) enhance the students' critical thinking skills and communication skills (written, oral, listening, and audio/visual presentation); 3) increase the students' interest in graduate studies by igniting that spark of interest through hands-on experiences in a research laboratory working in their field of interest; 4) introduce the students to the 'beyond the classroom' experience in a research setting; and 5) enhance the students' ability to think independently.

The project includes a strong emphasis on attracting under-represented groups, such as Native Americans and women, into this program. Last summer ten undergraduate students from SDSM&T, Oglala Lakota College and Montana State University were selected to participate in the first year of the REU Site and the All Nations Alliance for Minority Participation (ANAMP) undergraduate research program. The students were provided the opportunity to explore surface science and engineering research respectively under these programs. The focus on the research area of interfacial and surface science is a spin-off from the EPSCoR (Experimental Program to Stimulate Competitive Research) program in which SDSM&T has been actively involved for several years.

"This program offers some very unique undergraduate research opportunities for not only our students but also students from other universities in the region," states Dr. Winter, Director of the REU Site on campus.

In addition to conducting challenging laboratory research, the students develop their communication skills through written reports and oral presentations. This effort is led by Dr. Judy Sneller, Associate Professor of English at SDSM&T.

Seven SDSM&T faculty members served as mentors for the ten undergraduate students who conducted independent research over an eight-week period last summer. The students, with their research projects and their mentors, are as follows:

- Connie Giroux (Chem, junior, Rapid City), "The Synthesis and Characterization of Cobalt (III) Compounds"; Dr. Steven McDowell, Chair of Chemistry & Chemical Engineering and Associate Professor of Chemistry
- Sara Graham (Spec., sophomore, Rapid City), "Heavy Metals Uptake and Making Carrageenan Beads with Immobilized *Escherichia coli* (*E.coli*)"; Dr. Sookie Bang, Associate Professor of Biology
- Christopher Johnson (Chem, senior, Hill City), "Surface Modification of Polymethylmethacrylate Using Supercritical Carbon Dioxide"; Dr. David Dixon, Associate Professor of Chemical Engineering
- Jennifer Martin (Oglala Lakota College), "Studies on the Consumption of Bacteria by Amoebae"; Dr. Andrew Rogerson, former Associate Professor of Biology
- Richard May (Montana State University), "Langmuir Blodgett Technique to Produce a Thin Film for Fiber Optic Composites"; Dr. William Cross, Research Scientist III, Materials and Metallurgical Engineering
- Victoria Olson (ChemE, junior, Rapid City), "Deposition of Zirconia Using Self-Assembled Monolayers"; Dr. William Cross, Research Scientist III, Materials & Metallurgical Engineering
- Mike Podraza (Chem, senior, Hitchcock), "Polymethylmethacrylate Coating and Impregnation with 2, 2, 2-Trifluoroethyl Methacrylate"; Dr. David Dixon, Associate Professor of Chemical Engineering
- Craig Steffan (ChemE, senior, Hazen ND), "Assembly, Operation, and Theoretical Development of the Interfacial Force Microscope"; Dr. Robb Winter, R.L. Sandvig Professor of Chemical Engineering
- Bob Whipple (CEE, junior, Rapid City), "Water Quality of Rapid Creek"; Dr. Bruce Berdanier, Assistant Professor of Civil & Environmental Engineering
- Lonnie Wright (IE, sophomore, Ridgeview), "Nanometer Surface Preparation of Polymer Composites for Analysis with the Interfacial Force Microscope"; Dr. Robb Winter, R.L. Sandvig Professor of Chemical Engineering



Dr. Sookie Bang, Associate Professor of Biology, supervised the research conducted by Sara Graham of Rapid City.



Lonnie Wright operates the interfacial force microscope to study the nano-mechanical properties of a fiberglass epoxy composite under the direction of Dr. Robb Winter, R.L. Sandvig Professor of Chemical Engineering.

As evidenced in the above list, the research conducted by these students extended far beyond basic level research and covered a wide range of topics in chemical engineering and related fields. The students didn't spend their summer washing beakers and sweeping the lab floor! They were actively engaged in cutting-edge scientific research projects that have the potential for real world applications outside the lab.

For example, Sara Graham, a sophomore from Rapid City who is pursuing a career in nursing and microbiology, concentrated her research on heavy metals uptake and making carrageenan beads with immobilized *Escherichia coli* (*E. coli*). Carrageenan is a



Connie Giroux and Dr. Steven McDowell, Chair of Chemistry & Chemical Engineering and Associate Professor of Chemistry, analyze the data from their research.


polysaccharide-polymer extracted from seaweed. A process called "cell immobilization" results in the folding of a cell suspension in gelled carrageenan.

Currently SDSM&T's researchers are making carrageenan beads 5 mm in diameter and encapsulating a genetically engineered *E. coli* strain NCP, which contains genes for heavy metal uptake. This research is focused on the use of these immobilized cells to clean up areas that are contaminated with heavy metals, which would result in very significant environmental ramifications.

Lonnie Wright, a sophomore industrial engineering major from the Cheyenne River Reservation, prepared polymer matrix composites samples for analysis on the state-of-the-art piece of equipment called an interfacial force microscope. Immersed in the world of measuring results at the very minute level of nanometers and angstroms, his work was the first step in investigating the surface properties of polymer materials. Such research could help provide clues on how items made of fiberglass and other polymer composites, such as boat hulls or automobile fenders for example, could be made stronger to withstand greater impacts.

Applications currently are being accepted for participation in this summer's REU activities, which will be held June 1 - July 31, 1999. Participants will receive a stipend of \$4800 for the two-month period to cover expenses. Preference will be given to undergraduate students majoring in chemical engineering and allied fields of chemistry, physics and metallurgical engineering.

Exciting research opportunities are available in areas such as corrosion inhibition of metals and alloys; environmentally benign precious metal recovery; filled polymer interphase chemistry and chemical kinetics; filled polymer micromechanics; polymer matrix composites interphase chemistry and nanomechanics relationship; and polymer surface modification using supercritical fluids. In addition to the REU's special emphasis on faculty-student mentoring, participants will gain hands-on experience with state-of-the-art research instrumentation.

The application deadline is February 1, 1999. Additional information, including application forms, can be obtained by contacting Dr. Robb Winter at (605) 394-1237 or via email at rwinter@silver.sdsmt.edu. Information also is available on SDSM&T's web site at www.sdsmt.edu/mse/chemE/reu/info.html. 

Anchors Away

continued from page 3

SDSM&T researchers are conducting suction pile experiments in the campus laboratory facilities. After fully saturating the clay with water until it acquires the consistency of a slurry mixture, the water is slowly extracted until the mixture simulates the soil conditions found on the bottom of the ocean. Darin Hodges and Jeff Thomason, with the help of Yvonne Starostecka, are responsible for the



Dr. Bang and Jeff Thomason conduct tests on suction pile models in the SDSM&T lab.

laboratory experiments. Ph.D. candidates Yeongki Cho and Heuisoo Han are doing computer-modeling simulations for the project.

Navy officials are familiar with the caliber of Dr. Bang's engineering expertise. He has been working with U.S. Navy officials on anchor designs for the past five years. In addition, the Navy uses software written by Dr. Bang for designing anchors. Gene Remmer, ONR Program Director, and Bob Taylor, Technical Director, NFESC, are two of the key Navy officials who are actively engaged in overseeing the MOB feasibility and design studies.


The scope of the Navy's super-sized ocean structure is truly staggering. SDSM&T's geotechnical engineering research is an important component of this Navy project with potentially far-reaching consequences. When all of the advanced design technologies are developed and the feasibility of the floating base concept is established, the face of naval operations could change dramatically in the next millennium. 

Photo by Darrell Sawyer

Round 'Em Up!

Ranchers steer fossils to scientists for public education

Where ranchers now ride and cattle graze, an ancient ocean once covered western South Dakota. Millions of years before the cattle, horses and pickup trucks found on the ranches of today, this Great Plains region was ruled by dinosaurs, marine reptiles, giant diving birds and many other wild animals that are now extinct.

Many of these ranch lands not only provide ranchers with forage for their livestock, but also

flying reptile bird and a short-necked plesiosaur!

When he's not raising cattle or riding his cutting horses, Brown spends his free time searching for fossils or helping to prepare specimens that have been collected on his ranch. Saddles and bridles hang on the walls of his barn's tack room that also doubles as his fossil preparation work area. His passion for paleontology becomes quickly apparent after only a few minutes

of conversation. Scientific terms like *Hesperornis* and *Polycotylus* roll off his tongue as smoothly and easily as conversation about cattle and cutting horses. (*Hesperornis* was a large, loon-like flightless diving bird with teeth and a three-foot wing span.)

"I've always been interested in fossils since I was a kid," says Brown, who started hunting for fossils while still in grade school and had his parents take him to the Museum of Geology to identify some fossils he had found. By the age of 13 Ken had his first fossil find recorded. During the 1963 school year, he took a part-time job preparing fossils at the School of Mines, where he met Dr. Phil Bjork, who was a paleontology graduate student at the time and later became Director of the Museum of Geology.

Over the years many fossil specimens of Cretaceous reptiles, fish and birds have been collected by the Museum of Geology. In addition to giving his permission for SDSM&T paleontologists to recover fossil specimens on his ranch, Brown has demonstrated his deep commitment to keeping fossils in the public domain in another way.

In late 1996 Ken Brown made provisions in his will for his estate to give a fossiliferous portion of his ranch to SDSM&T. The land is to be used in perpetuity by the school's Museum of Geology and students to collect and preserve fossils recovered from the ranch. In addition, he made provisions in his will to make a testamentary gift of \$250,000 to establish the Kenneth G. Brown Marine Cretaceous Paleontological Endowment Fund. The earnings from the "Brown Paleo Fund" will provide support for the collection, preparation, cataloging, conservation and



contain a wide array of fossils that provide scientists with clues to prehistoric life. As a result of several successful partnerships between SDSM&T Museum of Geology paleontologists and area ranchers, many of these important fossil specimens have been "rounded up" and preserved for scientific study and public benefit.

The boots of Ken Brown, who ranches on Spring Creek near Hermosa, are firmly planted in both the agricultural and paleontological worlds. The top of the sign for his ranch even has metal depictions of two fossils found on his land—a prehistoric

Photos by Darrell Sawyer



Ken Brown shows Dr. Jim Martin, SDSM&T Curator of Vertebrate Paleontology, the preparation work he is doing on a fossil found on his ranch.

study of the fossils from the Brown ranch.

"Kenny is quite proficient in understanding the paleontological resources on his ranch," says Dr. Jim Martin, SDSM&T Curator of Vertebrate Paleontology, who has collected many fossils with Brown.

SDSM&T also has a good paleontology partnership with several other area ranchers such as Tom Conger of

Buffalo Gap. He operates the family ranch with his parents, Dane and Evelyn Conger. The Conger ranch has been a productive source of mosasaurs, plesiosaurs, fish birds, invertebrates and other Cretaceous fossils that are approximately 80 million years old.

"The Conger family has donated some fantastic specimens to the Museum of Geology," says Dr. Martin who has worked with the Congers since 1986. "One of the best specimens of its kind—a complete short-necked plesiosaur—was recovered from the Pierre Shale on the Conger Ranch. Moreover, Tom has aided in the recovery of many specimens on his land and elsewhere. Tom's equipment and trailer has borne many large specimens to the Museum."

The relationship between Linn and Doreen McCoy of Martin and the Museum of Geology goes back over twenty years. The McCoy's have opened their ranch for summer field digs conducted by SDSM&T paleontologists. Dr. Martin describes the Flint Hill area of their ranch as a classical Miocene site full of a relatively poorly known group of animals such as ancestral relatives of hippos, huge clawed herbivores, giant pigs, and rhinos. In addition fossils have been found from a suite of prehistoric carnivores that resembled big bear-like dogs.

The McCoy's ranch was the site where

Photo courtesy of Dr. James Martin



Tom Conger (left) and Linn and Doreen McCoy (right) have partnered with the Museum of Geology to preserve fossils on their ranches in the public domain.

Photo courtesy of Linn and Doreen McCoy



at this site in the late 1950's and has continued periodically since then. Fossils that have been recovered include specimens of prehistoric bone-crushing dogs, camels and horses. A camel skull found on the Geerson ranch, *Procamelus grandis*, is on display in the Museum of Geology.

A similar mammal producing site, but of slightly older age, is owned by Terry Springer of Gregory, SD. He and his family have kindly allowed the Museum personnel to investigate his land. This has resulted in the discovery of several new creatures

that were not previously known to science.

The cooperation and support of LeRoy and Suzanne Graves, who ranch near Valentine NE, has been instrumental in recovering and preserving fossils of Ice Age (Pleistocene) mammals for the public domain. The paleontological site on this ranch is an actively eroding spring face that results in fossils being exposed when the water eats back the wall. Calling the Graves

ranch a classical Ice Age fauna site, Dr. Martin describes LeRoy Graves as "a salt of the earth kind of guy" and Suzanne as having "the most uncanny sense of humor of anyone I've ever met."

Finding fossils on the Graves ranch is made easier by the white sandy soil and the fact that the fossilized bones are black. Manganese

in the ground water stains the bones black as the water comes through the sand. A wide range of Ice Age mammals have been collected at this site—giant camels, elephants, bison, badgers, coyotes, weasels, and prairie dogs.

Jennings and Shirley Floden of Mud Butte exemplify the type of civic-minded, generous ranch families who believe that fossil specimens should be collected in a scientific manner and preserved in the public domain for the benefit of future generations. The Flodens have demonstrated their deep commitment to

continued on page 21

Dr. Martin (BS Geol '71, MS Paleo '73) did his Master's thesis on small mammals from the early Miocene age. As a result of this work, Martin found the first *cricetid*, a type of mouse, found in North America from that particular time interval. Other SDSM&T graduate students have done their thesis field work at the McCoy's ranch, including Craig DeTample (MS Paleo '88), who served as executive director

"The Conger family has donated some fantastic specimens to the Museum of Geology," says Dr. Martin who has worked with the Congers since 1986. "One of the best specimens of its kind—a complete short-necked plesiosaur—was recovered from the Pierre Shale on the Conger Ranch."

of the South Dakota Discovery Center & Aquarium in Pierre until December of 1998.

Another important fossil site near Martin, SD, is the Big Spring Canyon area of the ranch owned by Danny and Polly Geerson. This area has been well known since the 1930's when University of California-Berkeley paleontologists collected specimens from the late Miocene age, which was approximately ten million years ago. A number of publications describing the mammalian assemblages resulted from this early work.

The School of Mines began collecting

Quarterly 9 SDSM&T



UP, UP, & AWAY & WRINKLE FREE!

Compliant Structures Laboratory conducts space-age research

SDSM&T's Compliant Structures Laboratory is conducting cutting-edge research that connects the campus to the space age. Imagine trying to keep a 300-foot wide Mylar balloon from wrinkling after it is inflated in outer space! That is just one example of the challenging, advanced technology research being done on the South Dakota Tech campus for our nation's space program and military agencies.

Utilizing laser vibrometers and other state-of-the-art equipment, SDSM&T's mechanical engineering faculty and students are studying the use of flexible structures in space—such as inflatable antennae, large membrane mirrors and solar concentrators on satellites. The lab also conducts deployment modeling of parachutes for the U.S. Army and high-altitude scientific balloons for the National Aeronautics and Space Administration (NASA).

The Compliant Structures Laboratory (CSL) is focused on promoting engineering based on compliance, or flexibility. Nature designs structures with varying degrees of flexibility, from the rigidity of rocks to trees bending in the wind. Some plants curl up at night to conserve energy; a bird has flexible wings. In both a literal and figurative sense, human beings also are flexible, as evidenced by the skin, organs, and joints of the human body.

Dr. Christopher H.M. Jenkins, Professor of Mechanical Engineering, founded the lab in 1993 to provide computational and experimental facilities for understanding and predicting the performance of structures with a high level of flexibility. Some of these membrane structures are made of materials as thin as sandwich bags and yet can carry loads up to three tons!

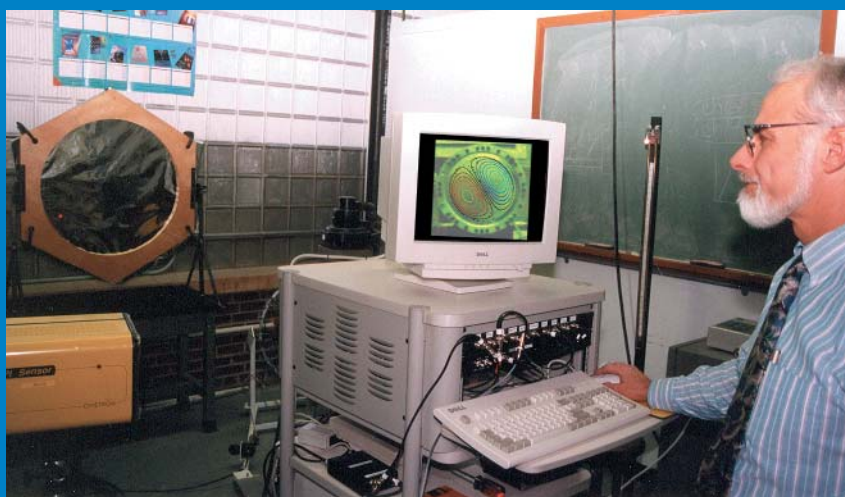
Included among Dr. Jenkins's CSL research is the Inflatable Antenna Experiment that was launched from the space shuttle a little over two years ago. The antenna was made of high-strength, lightweight plastic film. It had the flexibility to be compressed in volume to about the size of an office desk. When the space shuttle had reached its orbiting destination, the antenna was inflated to a size of 50' wide and 100' long—nearly the size of the shuttle itself!

To reduce the launching costs of space shuttle missions, NASA officials are interested in the development of faster, cheaper and better structures to carry into space that have less volume and weight. Inflatable structures hundreds of feet in diameter are currently being imagined!

Over the past five years the CSL has conducted research for the Air Force Office of Scientific Research, U.S. Army Research Office, Jet Propulsion Laboratory, NASA, National Science Foundation, and the Naval Research Laboratory. Some of this research has focused on the structural mechanics of large

membrane mirrors with a goal of developing larger diameter mirrors that can be utilized in space. Reducing the amount of wrinkles and vibrations in the membrane will result in a higher quality resolution of images produced by the mirror. The mirror in the Hubble Telescope, for example, was 4 ½ meters in diameter, which was the largest diameter rigid mirror that could be put in space.

SDSM&T's CSL facility is being utilized by the Naval Research Laboratory to improve the efficiency of solar power on satellites. With solar cells having only about 20% efficiency, SDSM&T researchers are working with Navy officials on the design and structural mechanics of a membrane trough that could be easily deployed after the satellite is launched, and which will "pack in" more sunlight to the solar cells. Using a lab scale model of this solar concentrator, the CSL's research is focused on structural modeling that will produce a membrane concentrating trough with a clean, smooth surface, and a minimal amount of wrinkling when the trough is deployed. The trough deployment concept is



Dr. Jenkins conducts membrane vibration tests using the laser vibrometer.

somewhat akin to that of a retractable ironing board, only on a much larger scale with material as thin as a Mylar balloon.

Dr. Jenkins has conducted structural modeling of the membrane trough to determine the thermodynamic loads of the solar concentrator. Temperature changes affect the wrinkling characteristics. The material expands and gets slacker when hot (closer to the solar cells), and is conversely more taut in areas that are colder and away from the solar cells.

The Compliant Structures Laboratory's research for the U.S. Army involves the development of capabilities to model the deployment of parachutes. Round, cross and wing-type parachutes are being modeled to include features such as stress and wrinkling upon inflation. Factors being evaluated include the effect of material properties during the period of time from when the parachute is slack, to when it inflates and becomes taut.

Photo by Darrell Sawyer

Trajectories are predicted based on shroud line asymmetries, and structural models are being coupled with computational fluid dynamics (CFD) codes. Dr. Jenkins was recently invited to Cambridge University in England to present results of this work.

The research being conducted by faculty and students in the CSL have many "real-world" applications. Enhancing the quality of antennae on space satellites will result in better resolution of transmissions for cell phones, televisions and other electronic devices. Increasing the level of advanced technology used on high altitude scientific balloons offers tremendous potential for NASA's "Mission to Planet Earth" program through better meteorological data measurements, soil moisture radiometers, and ozone degradation data.

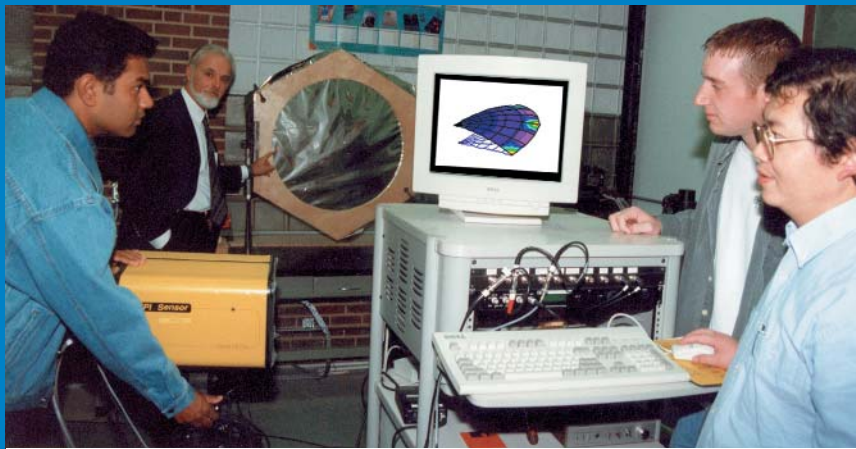
The CSL also is working with NASA's Goddard Space Center to test a sun shield prototype for the Next Generation Space Telescope. The goal is to design and build a telescope larger than the Hubble Telescope with a bigger lens. The current design for the sun shield over the telescope is an inflatable membrane. Goddard officials have sent a piece of the membrane material to SDSM&T for testing inside a vacuum chamber with the state-of-the-art laser vibrometer equipment.

The CSL research involves both contact sensors, such as an accelerometer, and non-contact sensory equipment, such as the laser vibrometer. For example, on stiff structures, temperature probes can be directly applied to determine temperature variations along the surface.

However, for very flexible structures, the capability to conduct research with non-contact sensors is very important. Because of the sensitivity of the ultra lightweight membrane material, any external contacts applied to the structure can skew the measurements of temperature, wrinkling, vibrations, stresses, and the like.

To control wrinkling, engineers first must be able to measure it. By applying various loads, CSL researchers can map the wrinkles of the surface of a membrane. Funded with support from a National Science Foundation grant, Dr. Jenkins and his students built an apparatus that uses a noncontact capacitance sensor to measure details about the wrinkle waves caused by shearing forces applied to the membrane's boundaries. New methods for accomplishing these same kinds of measurements, including optical interferometry, are being explored.

Research is being conducted by SDSM&T's Compliant Structures Laboratory for the Jet Propulsion Laboratory that utilizes an IBM robot as a non-contact tool to measure surface profiles related to temperature variations. In space, one part of an antenna can be in the shade and be very cold, while the rest of the



Mabesh Tampi, Dr. Jenkins, David Fitzgerald, and Xinxiang Liu (l to r) evaluate the computer modeling of a membrane antenna.

structure can be warmed by the sun. In the lab, an infrared digital camera rented from Video Therm, a company based in Rapid City, takes infrared pictures of the membranes as varying levels of heat are applied. The collected data is then input into theoretical models that can be used to address the question of whether surface degradation under nonuniform temperature can in fact be predicted.

"Nonuniform temperature can be a double-edged sword," says Dr. Jenkins.

"Unchecked, they can degrade

the surface, but on the other hand they can be used selectively to improve the surface."

The Air Force Office of Scientific Research initially funded this research at SDSM&T. The research has continued with support by the Jet Propulsion Laboratory.

In addition to force and temperature variations, vibrations also can cause wrinkling on membrane surfaces. The laser vibrometer referenced earlier is utilized by Dr. Jenkins and his CSL students to study the structural dynamics related to membrane vibrations. Acquired with the help of a \$150,000 NSF grant, this state-of-the-art equipment measures the Doppler shift in reflected laser light coming back from the surface. The Doppler effect can be compared to the shift in the sound of a train whistle as it gets nearer. There is a shift in the frequency of the sound or light wave due to the relative motion between the observer and the source.

The vibrometer scans the surface of the membrane in varying modes of motion—imagine a Mylar balloon breathing all the way out, breathing all the way in, half in/half out, or moving partially up or down in asymmetric modes. Dr. Jenkins has recently demonstrated the laser vibrometer to officials at the Air Force Research Laboratory at Kirtland Air Force Base, New Mexico.

SDSM&T's graduate students in mechanical engineering are taking advantage of the CSL's capabilities to conduct cutting-edge research and also gain valuable proficiency in operating the CSL's advanced technology equipment. David Fitzgerald of Marion, SD, is conducting some rather unique and challenging research as part of his graduate studies. After earning a Bachelor of Science degree in Mechanical Engineering with honors in 1997, Fitzgerald worked as a manufacturing engineer for OEM Worldwide in Watertown, SD. He is now applying his real world manufacturing experience to his graduate studies at SDSM&T by utilizing the laser vibrometer on dynamics of machining.

Surface roughness is often an undesirable result in lathe and milling operations. The "chatter" or vibrations resulting when the lathe is operating in certain modes causes additional processes to be required to achieve surface smoothness, which increases total product cost.

Many challenges exist for conducting vibration research on lathes. The lathe is not only rotating items at high speeds and

With support from South Dakota's EPSCoR (Experimental Program to Stimulate Competitive Research) program, this project is one of the first research projects being undertaken by SDSM&T's Center for Advanced Manufacturing and Production (CAMP). The research is designed to improve machining and manufacturing processes for industries in South Dakota, which could provide some direct benefits to the state's manufacturers and producers.

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Photo by Julie Smoragiewicz

In the powerful and provocative program on prejudice presented by Jane Elliot, nationally known race relations expert, Elliot (center) demonstrates how people wear shoes with heels to support the greater value we place on being tall.

SDSM&T REACHING OUT

South Dakota Tech's students, faculty, and staff are actively engaged in a wide range of educational, cultural and economic development outreach activities. These connections produce synergistic links with the community, K-12 students and teachers, private industry, government agencies, and other higher education institutions.

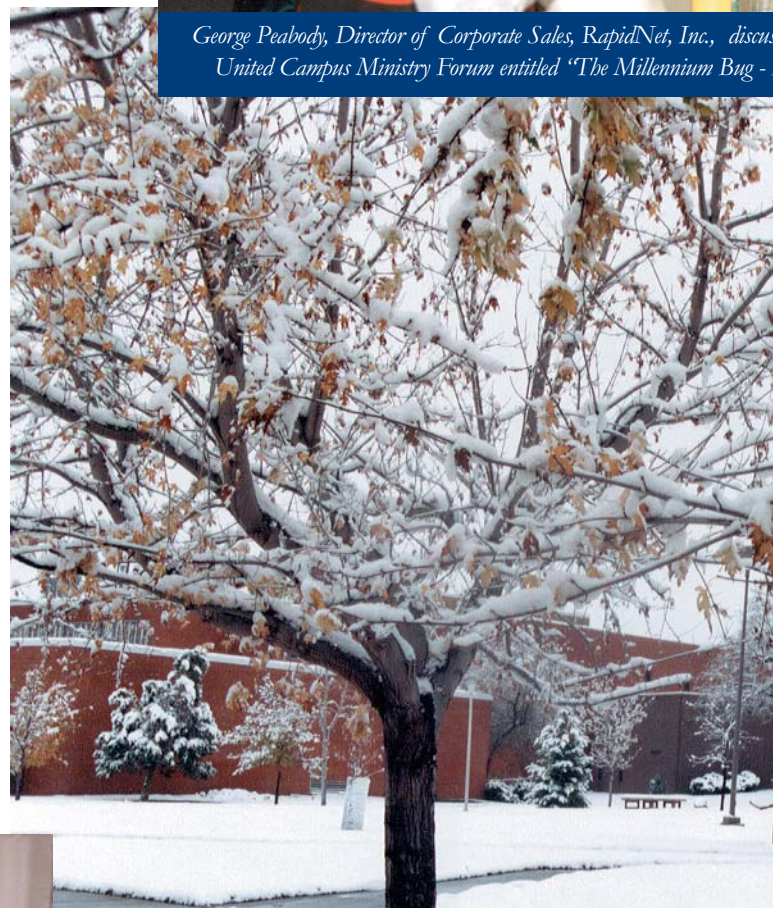


Photo by Darrell Sawyer



SDSM&T's Drama Club presented "An In-Flight Tour of New York City" for its fall production. Above, cast members dress for the play. William Barbe, Instructor of Drama, produced and directed the program.



Photo by Darrell Sawyer

George Peabody, Director of Corporate Sales, RapidNet, Inc., discussed the United Campus Ministry Forum entitled "The Millennium Bug -





...sses the Y2K problem at a
How Bad is the Byte?"

The Museum of Geology hosted a reception for individuals attending the Fifth Conference on Fossil Resources: "Partners Preserving our Past, Planning our Future." Pictured (l to r): Dr. Richard Gowen, SDSM&T President; Laurie Bryant (MS Paleo '69), BLM, Cheyenne WY; Dr. James Martin (BS Geol '71, MS Paleo '73), SDSM&T Curator of Vertebrate Paleontology; Mike Greenwald (MS Paleo '71), SDSM&T Research Scientist II; Bill Schurmann (BS GeolE '65), Museum Volunteer; David Cicimurri (MS Paleo '98); Heather Finlayson (MS Paleo '98); Rachel Benton (MS Paleo '91), Badlands National Park Paleontologist; and David Parris (MS Paleo '68), New Jersey State Museum Curator of Vertebrate Paleontology.



Photo by Julie Smoragiewicz



Photo by Darrell Sawyer



Photo by Darrell Sawyer

SDSM&T's Beta Phi Chapter of Alpha Chi Sigma fraternity recently helped Black Hills area Boy Scouts earn their chemistry merit badges. Boy Scouts proudly displaying the "slime" they made are (l to r) Josh Vukelich, Tim Squillace, David Williams, and Matt Parks. Alpha Chi Sigma members Keri Bachmeier and Rene Aldrich (right) conducted the hands-on chemistry lesson.



Photo by Darrell Sawyer

Dr. Robb Winter, R.L. Sandvig Professor of Chemical Engineering, (right) explains the injection molding machine to Craig Bailey, Director of TeAM (Technical Assistance for Manufacturing), an affiliate of the National Institute of Standards (NIST) and Technology Manufacturing Extension Partnership.



When the Friends of the Devereaux Library organized their first "Nostalgia Night " Film Series in 1995, the program was a big hit. Now, five years later, this community cultural activity is still going strong.

The "Nostalgia Night 1999" series marks the fifth year that the Friends of the Devereaux Library are offering movie classics on the big screen in the historic Elks Theatre in downtown Rapid City. When the 1999 series wraps up in mid-March, a total of fifty films will have been featured since the Nostalgia Night series began five years ago.

Approximately 400 people have attended each of the films shown to date, which represents a combined series attendance of 16,000 over the past four years. Assuming that the ten films in the 1999 series draw a similar number of moviegoers, the total attendance will reach an estimated 20,000 by the conclusion of this year's film series.

"The majority of our patrons are from the off-campus community and keep coming back year after year," says Patty Andersen, Director of the Devereaux Library. "The evenings when these movies are shown have become both social and cultural events for many individuals. Before the final film of the 1998 series had been shown last March, some patrons already were asking about which films we would be offering in 1999!"

The "Nostalgia Night 1999" Film Series features the works of great movie directors such as John Ford, Otto Preminger, John Huston, Francis Ford Coppola and several others. With support from the Elks Theatre and several local sponsors, the Friends of the Devereaux Library will host "Light! Camera! Action!" for ten consecutive Sunday evenings beginning January 10 and running through March 14, 1999. All shows begin at 6:00 p.m.

The ten films in the 1999 film series, their directors and the local sponsors are as follows: **The Mouse That Roared**, Jack Arnold, Pet Pantry; **Mister Roberts**, John Ford and Mervyn LeRoy, RE/SPEC and Brink Electric Construction; **Laura**, Otto Preminger, SDSM&T Alumni Association; **An American In Paris**, Vincente Minnelli, SDSM&T Foundation; **Giant**, George Stevens, United Corporation and TSP; **My Favorite Wife**, Garson Kanin, Hills Material Company; **The Man Who Would be King**, John Huston, National American University and Aurora Creative Solutions; **Finian's Rainbow**, Francis Ford Coppola, Dacotah Cement and Dean Kurtz Construction; **Gaslight**, George Cukor, Lynn, Jackson, Shultz and Lebrun, P.C.; and **How the West Was Won**, John Ford and Henry Hathaway, Friends of the Devereaux Library.

Proceeds from the film series are used to support programs and resources at SDSM&T's Devereaux Library. Enhancements that have been purchased to date with funds from the film series include the popular "Down Time" reading area for magazines and newspapers, and furnishings for the electronic reference area. Plans are also underway for an outside book drop.

This year the profits will be utilized to establish a video and compact disc collection for students to check out. Some funds will be used as seed money to purchase twenty years of previous patent and trademark files. SDSM&T's Devereaux Library is an official Patent and

Trademark Depository Library, the only such designation in South Dakota. Since

obtaining this official status in 1994, the library has been working to acquire the previous years of back files that are necessary to make the depository's collection complete.

In addition, the Friends of the Devereaux Library have provided funds to several student organizations on campus. Student groups that have received funds include the Minority Student Center; Alpha Sigma Lambda, a national honor society for non-traditional students; KTEQ-Radio, SDSM&T's student-operated radio station; and the Solar Motion Team.

Charles Mickel, an attorney in Rapid City, was president of the Friends of the Devereaux Library when the first Nostalgia Night film series was being planned. He continued in that capacity for four years. In 1998 SDSM&T alumna Kathryn Johnson (PhD Geol '86), who owns an environmental consulting firm named Johnson Environmental Concepts, served as president of the Friends of the Devereaux Library. Another SDSM&T graduate, Mely Rahn (BS CE '82), who is project manager for the City of Rapid City, is serving as president of the group during 1999.

The cooperation and support of the Elks Theatre management and staff have been key ingredients in the success of the film series. Completely remodeled, the historic theatre building has undergone a major renovation project that includes the installation of surround-sound. Library officials have nothing but high praise for Doug and Laurie Andrews, owners of the historic theatre, and Curt Small, manager.

"They are sweethearts," says Janet Taylor, Coordinator of Library Operations. "They go out of their way to make the film series a pleasant event for everyone."

Selecting the movies for each film series is no easy feat. After considerable deliberation, the Board of Directors for the Friends of the Devereaux Library selects a theme along with approximately 30 movies that fit the theme. Curt Small, manager of the Elks Theatre, then starts checking on which films are available, the cost, and the other arrangements necessary to show a particular movie.

Finding the desired films is becoming increasingly difficult. Many are no longer available because current owners will not allow them to be released or because they have been damaged due to improper preservation techniques, which is particularly a problem for films produced in the late 1960's and early 1970's.

The success of the Devereaux film series is rather unique. When Doug and Laurie Andrews gave a presentation about the Nostalgia Night series to the National Theater Owners Association in 1995, their colleagues predicted that the series would not last very long based on their experiences with similar programs.

Thanks to the strong support of the Rapid City community and the cooperation of the Elks Theatre, these naysayers have been proved wrong. In fact, Devereaux Library officials have fielded calls from as far away as the East Coast from individuals wanting to know the secret behind the success of this film series.

Ticket booklets for all ten films in the 1999 series cost \$30 and are available at the Prince & Pauper Book Shop, Book & Company, the Elks Theatre, and the SDSM&T Devereaux Library. Individual tickets will be sold at the door for \$4.50 on a space available basis the evening of the performance. For additional information, call the Devereaux Library at 394-1262. ✂



Lights! Camera! Action!

Willkommen!

Program fosters educational and cultural exchanges

To paraphrase President John F. Kennedy's 1963 speech in front of the Berlin Wall, at least fourteen students from Germany can declare "Ich bin ein Hardrocker." These German students came to South Dakota under an exchange program established four years ago between SDSM&T and the Technical University Bergakademie in Freiberg, Germany.

Four students from Germany currently are enrolled at South Dakota Tech—Silva Werner and Christian Geissler, who are attending under the auspices of this exchange program; Lars Weiershauser, a Fulbright Scholar who selected SDSM&T for his graduate studies; and Christian Sedlatschek, a participant in last year's exchange program who decided to stay and become a degree-seeking student. Geology is a popular field of study for these students. Three of them are geology majors, with Silva Werner and Christian Sedlatschek enrolled as undergraduates and Lars Weiershauser pursuing a Master of Science degree in geology.

Dr. Herman Fink, a university professor in Germany who taught English to business students, was the impetus for establishing the exchange program. Following the fall of the Berlin Wall, he recognized the problems that East Germans would face in catching up to their colleagues in West Germany and elsewhere.

A strong believer in the value of studying abroad, he pursued the establishment of student exchange programs between Bergakademie and similar universities in the U.S. The oldest mining school in the world, Bergakademie is located in Freiberg, Saxony, in southeastern Germany not far from the Czech and Slovak borders. The Saxony region has a long industrial tradition that includes a mining industry dating back to the Middle Ages.

During his travels to various U.S. universities, Dr. Fink visited with Dr. James Goodman, former SDSM&T Vice President for Academic Affairs, about developing a student exchange program with Bergakademie. The two institutions were similar in size, academic orientation, cooperative faculty and administrators, geographic and socio-demographic conditions.

In addition to the Rapid City area's historical and sentimental ties with Germany, SDSM&T's main reason for participating in the exchange program is the school's educational mission to prepare its students to meet the challenges of the global future. In addition to broadening the cultural diversity of the South Dakota Tech student body, the exchange program could help SDSM&T students compete in the global marketplace in working with international companies and clients.

The exchange agreement between the two institutions was formally signed in 1994. Vi Stoltz, senior secretary in the Vice President's Office, and Barb Dolan, coordinator of academic support development, helped to work out the arrangements for implementing the program, such as differences in the school calendars, curriculum, and transfer of course credits. Suzi Aadland, SDSM&T Director of International Affairs, also plays a key role by helping the students with their visa paperwork and with adjusting to their new campus life at South Dakota Tech. Last summer an agreement was signed to extend the exchange program, with the support of Dr. Richard Gowen, SDSM&T President, and Dr. Karen Whitehead, Vice President for Academic Affairs.

Interest runs high among Bergakademie students in being accepted for the exchange program. They recognize the value that developing their English language skills can have on their careers. Competition is intense for the two slots available annually under

the program to study at SDSM&T.

Some SDSM&T students also have studied at universities in Germany. Cory Svobodny, who was enrolled as a freshman at SDSM&T last year, studied at Bergakademie under this exchange program and found the experience very positive and worthwhile.

The agreement also has fostered academic cooperation and interaction between the two institutions. In the summer of 1996, Dr. Jan Puszynski, SDSM&T Professor of Chemical Engineering, was invited by the Department of Ceramics at Freiberg University to present a seminar entitled "Combustion Synthesis and Densification of Advanced Ceramic and Intermetallic Materials."

The exchange program also provides other benefits. In the fall of 1995 Berthed Liebig came to SDSM&T from Germany under the bilateral agreement to study advanced ceramics. While at SDSM&T, he worked on a research project entitled "High Pressure Synthesis of Silicon Nitride and Silicon Oxynitride in a Self-sustaining Regime" under the direction of Dr. Puszynski. This research resulted in the publication of a journal paper and three presentations at national and international conferences. After returning to Freiberg to pursue his M.S. degree, Liebig recently was accepted into SDSM&T's Ph.D. program in materials engineering and sciences. In his doctoral studies at SDSM&T, he will join Dr. Puszynski's research group, with his work being partially supported by a National Science Foundation grant.

Dr. Herman Fink recognizes the exchange program's benefits both to students and the institutions. "The feedback in practically all cases has been overwhelmingly positive—a new life experience for the students and a lifelong lasting effect upon education," states Dr. Fink. "The true and real effects and the lasting friendships that develop from these exchanges cannot be described in a few words."

Barb Dolan and Dr. Fink presented a paper about the SDSM&T-Bergakademie exchange program at the National Association of Student Personnel Administrators International Symposium in Chicago a few years ago.

From Bergakademie a couple hundred miles east of Germany's Black Forest, it is a long way to the SDSM&T campus in the Black Hills of South Dakota. The cultural and academic connections established through this exchange program are shortening those distances. The German students contribute to the cultural environment of the campus and also prepare South Dakota Tech students to compete in the global economy. ✂

Lars Weiershauser, Fulbright Scholar, examines moon rock samples with a petrographic microscope.



ANOTHER BRICK

Campus digs deep to support

October 20, 1998 was a day of historic proportions for SDSM&T as a new benchmark was announced in the school's capital campaign, *VISION 2000: Leadership for the Next Century*. After the campaign's successful national launching in April 1998, school officials saw a need to thank the campus community.

To recognize faculty and staff for their generous support, the Foundation sponsored an evening of celebration that included a special premiere of *VISION 2000: The Movie*. Over 100 faculty, staff and friends gathered to hear the news that commitments to the campaign from campus employees had reached over \$550,000! This new level brings the total raised to \$11,023,578 as the campaign moves closer to achieving its ultimate goal of \$16 million.

The evening of October 20th began with a social hour in Yesterday's Ballroom at the grand Hotel Alex Johnson where regal chandeliers and ornate woodwork created a special ambiance. Guests arrived early to enjoy the company of their co-workers. Decorating the room were gold and blue balloons and golden stars showing the names

of campus leaders who had committed to the campaign.

As seven o'clock approached, the partygoers journeyed across the street to the historic Elks Theatre with its big screen and red velvet curtains. With popcorn and soft drinks in hand, the group entered the theatre and watched a pre-movie slide show of historic and current snapshots of the campus. After thanking the group for their support, Dr. Richard Gowen invited the campus community to sit back and enjoy SDSM&T's first-ever cinema production, *VISION 2000: The Movie*.

The movie, which "stars" SDSM&T community members of yesterday and today, documents the history of the institution and highlights significant regional, national and world events. The thirty-minute film was locally produced by Linn Productions, directed by Irene Handren-Seals and written and narrated by Eric Johnson. The movie received a "two thumbs up" rating from everyone who viewed it, regardless of their connection to the school.

After the showing, Dr. Howard Peterson, Chairman of the SDSM&T Foundation and Dean of Students Emeritus, briefly took the stage. He praised the eighty-five campus leaders who had committed over \$550,000 toward *VISION 2000*.

"This financial commitment further demonstrates the unselfish nature of the staff and

faculty," said Peterson. "Their financial contributions will help achieve the goals of the capital campaign and insure that our traditions of excellence will continue into the next century."

Every faculty and staff member who pledges \$1,000 or more over a five-year period is designated as a Vision 2000 Campus Leader. Each of these individuals will be presented with a special memento in recognition of their support. The Campus Leaders will each receive a brick saved from the old Liberal Arts Building with the Arch engraved on it.

VISION 2000: The Movie is available for viewing at the SDSM&T Foundation Office. To learn more about *VISION 2000* or to schedule a special performance of the movie, contact the SDSM&T Foundation by calling (605) 394-2436 or (800) 211-7591.

SDSM&T Foundation Vision 2000: Leadership for the Next Century National Campus Leaders

ENDORSEMENT CHAIRS

- William (CE '44) & Myrna Coyle
- Harvey R. (Pres Emeritus) & Jean Fraser
- Richard J. (SDSM&T President) & Nancy Gowen
- Paul (HON '94) & Virginia Gries
- L. R. (Dean of Students Emeritus) & Ruth Palmerton
- Howard C. (GeolE '50) & Lenatt Peterson
- Richard A. (Pres Emeritus) & Elaine Schleusener

Foundation President Rod Pappel welcomes movie goers!

Lenatt and Howard Peterson, Dean of Students Emeritus, enjoy the evening events with Marjorie Marken, SDSM&T Budgets Manager.



REPORT FOUNDATION CAMPAIGN

CO-CHAIRS: \$100,000

- John J. Dunn
- William L. (EE '49) & Stella Hughes

CAMPAIGN CABINET: \$25,000

- John D. "Duff" (MinE '55) Erickson
- Harold & Laura Orville
- Larry A. (EE '69) Simonson & Naomi Sage
- Karen L. Whitehead (SDSM&T Vice President)

CAMPAIGN COUNCIL: \$10,000

- Ed Corwin & Antonette M. "Toni" (CSC '85) Logar
- Arden D. (GeolE '79) & Tamera Davis
- Srinivasa L. (GeolE '74) & Sarada Iyer
- Stuart D. (EE '82) & Mary Kellogg
- Rod (ME '77) & Cindy Pappel
- Keith O. Pruitt
- Mely D. (CE '82) & Perry Rahn
- Julie & Jim Smoragiewicz
- Glen A. & Jan S. Stone

DIPLOMATS: \$5,000

- Arthur Alleger
- Sanna & Ron Asmussen
- Sangchul & Sookie Bang
- Carrie & Bob Christenson
- Kenneth N. Han
- Tim & Marilyn Henderson
- Stanley & Carol Howard
- James R. (Mtro '71) Miller
- V. & Vijaya Ramakrishnan
- Tom Rudebusch
- Hugh Welsh

AMBASSADORS: \$1,000

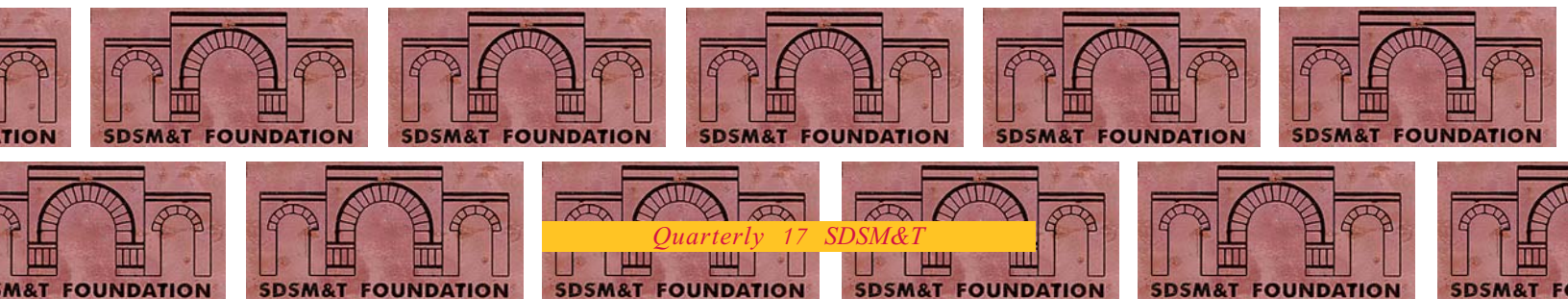
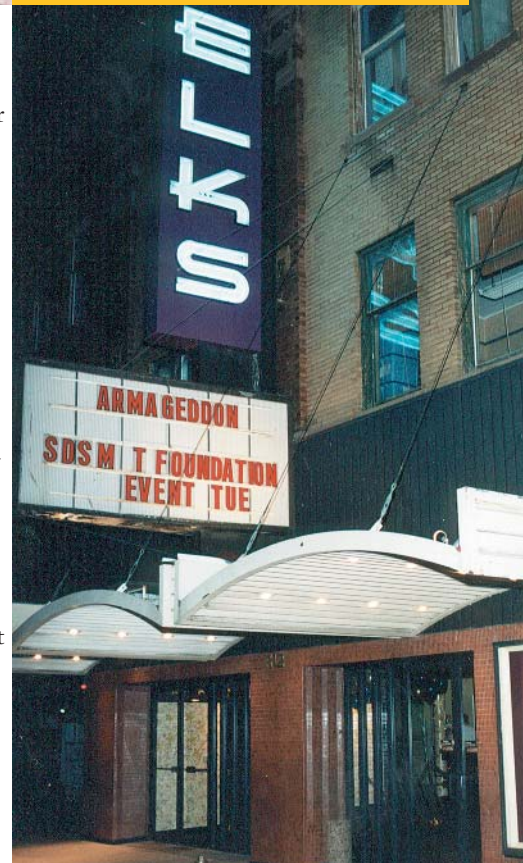
- Suzi Aadland
- Patricia M. Andersen
- Michael & Kathleen Batchelder

- Steve (CSC '94) Bauer
- Gail & Mark Boddicker
- Francine Campone & Edward Spargo
- Sandy & Scott Carlson
- Jerry Chaney
- James W. Cote, Jr.
- Marilyn & Steve Denison
- Andrew Detwiler
- Beth & Jay Deutscher
- Rand (Mtro '92) & Margaret Feind
- Barbara Felderman
- Sandy Fischer
- Becky & Darrell Fish
- James E. Fox
- George W. Gladfelter
- Sidney G. Goss
- David H. (EE '59) Grow
- M. R. (CE '69) Hansen
- John H. & Dolores A. Helsdon
- Zbigniew & Halina Hladysz
- Wendell H. Hovey & Sydney A. Ayotte
- Bradley K. (EE '92) & Brenda Johnson
- L. Ronald (Phys '70) Johnson
- Bill & Pauline Jones
- Jon J. (MetE '84) & Ann Kellar
- Scott (CE '77) & Mary (IS '98) Kenner
- Fred J. (Phys '69) Kopp
- Douglas & Suzanne Lange
- Mike (ME '72) Langerman
- Sheila & Smokey Lien
- Marjorie M. Marken
- Katherine McCarville
- M. Steven McDowell
- Larry (EE '67) Meiners
- Henry V. (CE '73) Mott & Martha L. Prentice

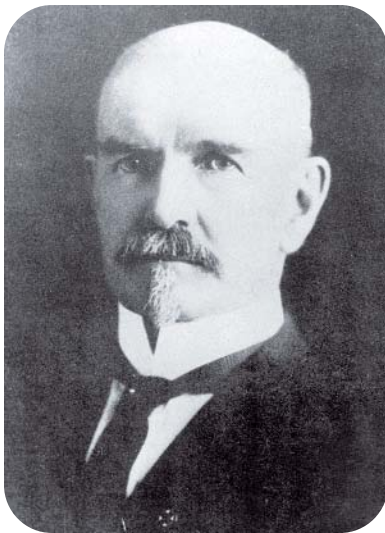


Jim Munro, Professor of Chemistry and Chemical Engineering and Verna and Mike Langerman, Chair and Professor of Mechanical Engineering pose for a quick picture.

- Jim (Chem '72) & René Munro
- Valerie Napier
- Dale & Ruby Nickels
- Roger L. (Math '65) Opp
- Robert J. Reznicek
- Darrell & Karla Sawyer
- Bryan (CSC '89) & Tamara Schumacher
- Sue Shirley (IS '94) & Daniel L. (ME '92) Sloat
- Cassie M. Thayer
- Lana Thom
- Timothy J. (Chem '84) & Tamara L. Vottero
- Joe & Vicki Wallace
- Robb M. Winter & Julia A. Montgomery
- Patrick & Marilyn Zimmerman ✂



McGillcuddy Adds Color to Early Campus History



Dr. Valentine
McGillcuddy

Dean
1893-1897

The ties between SDSM&T and Native Americans in the region were first forged more than a century ago through Dr. Valentine McGillcuddy. This colorful character left his mark on the history of the campus, the community and the Lakota people.

McGillcuddy's life parallels most of the major events that occurred in the Black Hills region during the last quarter of the 19th century. He knew Crazy Horse, Red Cloud, Calamity Jane, Wild Bill Hickock, Buffalo Bill and many other prominent figures of that era.

Trained as a physician, he first came to the Black Hills in 1875 as a topographer for the Jenney-Newton Expedition sent by the U.S. government to the Black Hills to explore the region's gold potential. McGillcuddy became the first white man to climb Harney Peak and stand on top of the 7,500 foot mountain.

Rumors and reports about finding gold in the Black Hills spread like wildfire. The ensuing gold rush stampede brought throngs of fortune hunters to the area. With dreams of striking it rich, they paid little heed to the 1868 Treaty of Fort Laramie that had set aside the Black Hills and most of western South Dakota as part of the Great Sioux Reservation. In the summer of 1876, the resulting tensions led to the Battle of the Little Big Horn, during which time McGillcuddy served as a field surgeon for General George Crook's command.

He was later assigned to Fort Robinson as assistant post-surgeon, where he treated Crazy Horse's wife who was seriously ill. As the health of his wife improved, Crazy Horse became friends with McGillcuddy. When the chief was stabbed by a soldier's bayonet during a tense situation at Fort Robinson, the trusted Dr. McGillcuddy treated the dying Sioux warrior, earning the name *Tasunka Witko Kola*, Crazy Horse's friend. (*McGillcuddy Agent*, Julie B. McGillcuddy, Stanford University Press, 1941, pp. 39-87)

In 1879 McGillcuddy was named agent of the Pine Ridge Agency, a position he held for seven years. During his tenure, he won the support of many tribal leaders by implementing several changes at the Pine Ridge Agency. He was forced to resign in 1886 after angering officials of the Bureau of Indian Affairs.

Moving to Rapid City with his wife, Fanny, Dr. McGillcuddy quickly became an active and leading member of the local financial and business community. He served as president of Lakota Banking and Investment and was vice president of Black Hills National Bank. McGillcuddy organized Dakota Power, the forerunner to today's Black Hills Power and Light Company. In addition, he held the position of surgeon-general of the Governor's staff. In 1889 McGillcuddy sent four live buffalo to the Smithsonian Institution's National Museum in Washington, DC, where they were displayed to the public.

In 1890, fears were increasing over the

Ghost Dances that Indians were holding on the reservation in the hope that their Messiah would come and restore their lands. McGillcuddy was asked to return to Pine Ridge to help alleviate the rising tensions. However, because he was no longer the agent, he could offer little hope to his Sioux friends that he would be able to help in resolving the situation. When the tragic Wounded Knee Massacre occurred in late December of 1890, Dr. McGillcuddy stayed in Pine Ridge and provided medical treatment to the wounded.



Photo by Julie Smoragiewicz

Rand Smith, McGillcuddy impersonator, (San Antonio, TX) shares McGillcuddy stories with descendants of the SDSM&T dean.

Standing (l to r): Norm Charles, Dr. Richard Gowen, SDSM&T President, and Ted Gull from NASA.

Sitting (l to r): Nancy Charles, Kristy Charles, and Matt Charles. Kneeling (l to r): Bill Charles, Becky Kruse, and Rand Smith.

In April of 1891, four months after the Wounded Knee Massacre, McGillcuddy was elected president of the School of Mines Board of Trustees. He took over as president during a period when the school was struggling with budgets and enrollments and when many area residents "felt practical training served more purpose than a college degree." (*Centennial: An Illustrated History 1885-1985*, Ruth Anne Stymiest, pp. 16-19)

In late 1893, McGillcuddy resigned as president of the Board of Trustees and became dean of the school, a position comparable to the university president today. Insufficient funds and low student enrollment created a difficult period for the institution.

With only 42 students enrolled in 1894, some individuals, including a Board of Regents member, raised the question of whether the school should be closed. However, after visiting the institution, this Regent changed his mind and stated that "work is not to be measured entirely by the number of students." The school's extremely tight budget is reflected in the equipment purchases for 1893—a typewriter and a camera for field work.

While he was dean, McGillcuddy succeeded in acquiring an extensive collection

continued on the next page

of tin ore samples for the school's museum. Progress also was made in improving the campus grounds after he was authorized to spend "up to \$50 for shade trees to improve the somewhat bleak and barren appearance of the School of Mines." (*Centennial*, pp. 18-19)

Following the death of his wife, Fanny, McGillicuddy resigned as the dean of the School of Mines in 1897 and also as mayor of Rapid City, a position he held for two years. Moving to the West Coast, he assiduously treated victims of the flu epidemic that swept the nation in 1918, even traveling to Alaska at the age of 70.

When McGillicuddy died in 1939 at the age of 90, the flag at Pine Ridge was lowered to at half-mast in honor of the man who had treated Crazy Horse and befriended many Native Americans. Ironically, the flag hung from the staff that McGillicuddy had erected sixty years earlier when he had raised the first flag flown at an Indian agency in the United States.

The plaque on the crypt containing his ashes at the top of Harney Peak reflects the esteem in which McGillicuddy was held. Inscribed on this plaque are the words *Wasicu Wakan*, the Lakota term for "Holy Medicine Man." ✂

PERSONNEL

Changes

WELCOME:

Marcia K. Bawdon, Sales Clerk, University Bookstore (11/2/98)

Zhong Tao Cai, Research Sci I, Grad. Ed/Spon. Programs (12/1/98)

Mary Kenner, (temporary employee), Bus. & Admin.-Debit Card/Cashier Office (11/2/98)

Nam-Soo (Peter) Kim, (temporary employee), Materials Science & Eng. (11/5/98)

Jenny Mathison, Admissions Counselor, EMS (12/7/98)

Susan J. Nell, Child Care Worker, Little Miner's Clubhouse (11/2/98)

Heather Schilling, Director of SKILL (11/9/98)

Jenette Ziadat, Child Care Worker, Little Miner's Clubhouse (11/17/98)

RECLASSIFICATION:

Marilyn Denison, Physical Plant, was reclassified as Administrative Assistant I from Senior Secretary effective 10/1/98.

RESEARCH NOTES

Dr. Chris Jenkins, Professor of Mechanical Engineering, and **Dr. Robb Winter**, R.L. Sandvig Professor of Chemical Engineering, were awarded \$229,969 from the National Science Foundation (NSF) [Montana State University - prime] for research entitled "Vibration/Creep Interaction Effects on the Long Term Durability of Polymers and Polymer Matrix Composites."

Katherine McCarville, Director of Instructional Technology Services, received \$175,000 in NSF funds (North Dakota State University-prime) for "High-Performance Network Connection in Support of Meritorious Research Dakotalink."

Dr. Francine Campone, Associate Dean of Students, was awarded \$54,704 from NASA to provide "Scientific Knowledge for Indian Learning and Leadership for Mission to Planet Earth" and also \$105,995.52 in additional funds for "AISTEC - Year 5" (New Mexico Highlands University - prime).

The NSF awarded **Dr. Harold Orville**, Distinguished Professor Emeritus of Atmospheric Sciences, and **Dr. Richard Farley**, Research Scientist IV, Institute of Atmospheric Sciences, \$142,500 in additional funds for "The Numerical Simulation of Weather Modification by Cloud Seeding."

Dr. V. Ramakrishnan, Distinguished Professor of Civil and Environmental Engineering, received \$129,112 in additional funds from the South Dakota Department of Transportation for the "Evaluation of High Performance Concrete in Four Bridge Decks as well as Prestressed Girders for Two Bridges."

The U.S. Geological Survey awarded \$81,060 in additional funds to **Dr. Tom Propson**, Professor Emeritus of Civil Engineering, for his "Water Resource Investigations and Research."

Ford Motor Company has awarded \$42,500 to **Dr. Sanjeev Khanna**, Assistant Professor of Mechanical Engineering, for his research on "Improving Stiffness and Crash Resistance of Automobile Body by Selective Use of Reinforced Structural Foams."

Dr. Dan Dolan, Professor of Mechanical Engineering and Director of CAMP Academic Programs, and **Dr. Srinivasa Iyer**, Professor of Civil & Environmental Engineering and Director of CAMP Industry Programs, were awarded \$44,525 by the South Dakota Department of Environmental & Natural Resources for "Industrial Assessments for Small Manufacturers."

Dr. Paul Smith, Professor Emeritus of Atmospheric Sciences, received \$35,309 in additional NSF funds for "T-28 Deployment to Colorado."

The South Dakota Humanities Council selected **Dr. Judy Sneller**, Associate Professor of English, as the recipient of a \$20,199 grant for "Life of the Great Plains: An Interdisciplinary Symposium."

The Bush Foundation awarded **Dr. Karen Whitehead**, Vice President for Academic Affairs, \$20,000 for a "Faculty Development Planning Grant for South Dakota School of Mines & Technology."

Dr. Sookie Bang, Associate Professor of Biology, has been awarded \$15,000 from the Naval Research Laboratory for her project entitled "Development of Genetically Engineered Bacterial Biosorbents."

Dr. Jan Puszyński, Professor of Chemical Engineering, received \$15,000 from the U.S. Department of Defense Indian Head Division, NAVSURWARCEN for his research project entitled "Investigation of Exothermic Metal-Metal Reactions for their Potential Application as Ignition Delay Mixtures."

The National Science Foundation has awarded **Dr. Jon Kellar**, Associate Professor of Materials and Metallurgical Engineering, \$10,000 in additional funds for "Research Experience for Undergraduates - Supplement Presidential Faculty Fellows Award."

Dr. Sangchul Bang, Dean of the College of Earth Systems and Professor of Civil & Environmental Engineering, was awarded \$5,000 from the NSFSA Association of International Educators for "Korean Student Assistance Awards Program (KSAAP) Application."



Playing the Field



Intramurals are popular among Tech students



They're not couch potatoes. They don't spend all of their free time plopped in front of a TV set flipping through the channels with the remote control. Instead they are the large number of students who compete in intramural athletics at South Dakota Tech.

From flag football to water polo to 3-on-3 basketball, SDSM&T students are offered a wide range of intramural sports.

Throughout the academic year many students participate in various intramural team and individual competitions that foster a spirit of sportsmanship and fair play.

In the three years that Dana Pederson has served as Intramural Director, SDSM&T's intramural program has continued to grow. Several sports have been added, such as co-ed water polo, co-ed 4-on-4 wallyball, team handball and co-ed water football. Volleyball, indoor soccer and softball also are offered

divisions. The men's flag football and 3-on-3 basketball sports offer participants the option of playing on either power or recreation teams, depending on the desired level of competition. Intramural racquetball tournaments and team handball

as co-ed team sports at SDSM&T.


The intramural competitions for flag football, 5-on-5 basketball, 3-on-3 basketball, and 6-on-6 volleyball are divided into men's and women's

seen an increase in the number of teams competing in flag football (20 teams - 4 women's and 16 men's), co-ed volleyball (10 teams), and 3-on-3 basketball (28 teams - 4 women's and 24 men's).

"It is good to be physically active," says Dana Pederson in describing the value of participating in intramural sports. "It gives students a time to relieve some stress and take a break from their academic loads. Intramurals provide healthy competition as well as social benefits for the students."

Based on comments and

feedback from student participants, Pederson believes that South Dakota Tech has a good intramural program. For a school of its size, SDSM&T offers a wide variety of intramural sports.

Beneath the brains of these budding engineers beat the hearts of student athletes who enjoy the spirit of competition and the camaraderie offered by intramural sports. 

"It is good to be physically active," says Dana Pederson in describing the value of participating in intramural sports. "It gives students a time to relieve some stress and take a break from their academic loads. Intramurals provide healthy competition as well as social benefits for the students."

contests also are offered. In addition, leagues for pool, bowling and ping-pong are held at Grubby's Gameroom.

The total number of participants in all the intramural sports exceeded 1,300 in both the 1996-97 and 1997-98 academic years. This represents approximately 800 individual students or nearly 40% of the students due to the fact that several students participate in more than one intramural activity each year. The current academic year has



Round 'Em Up!

continued from page 9

these principles.

In the early 1980's the Flodens asked Dr. Phil Bjork, Museum of Geology Director, to help identify the bones that protruded from a ragged butte on their ranch. The Flodens and their ranch neighbors assisted Dr. Bjork and his crew in excavating the soil in which the fossils were embedded in the steep butte. When a serrated tooth was found among the large bones, Dr. Bjork identified the fossils as that of a *Tyrannosaurus rex*. Jennings had known of the fossil's existence in the butte since he was a young boy, but no one had identified it as a *T. rex* until Dr. Bjork visited the site. This was the first *T. rex* skeleton excavated in South Dakota and only the sixth found in the world!

Instead of selling this spectacular specimen found on their ranch, Jennings and Shirley Floden donated it to the Museum of Geology. The 67-million year old skull of the largest meat-eater ever to

Photo courtesy of Dr. James Martin



Jesse Marty, Ben Ruby, Jennings Floden and Dr. Jim Martin (l to r) take a look at the *T. rex* found on the Floden ranch in 1981.

friends and supporters of the Museum of Geology for many years. In addition, they have been advocates for the proper care and preservation of fossil resources found on private lands. Shirley also served as a member of the State Paleontology Task Force a few years ago, representing the interests of ranch owners.

SDSM&T paleontologists also have collected specimens and worked with many other area ranchers in identifying fossils found on their lands. The Museum of Geology collections contain a staggering number of specimens that were collected from private lands. Dr. Jim Martin estimates that at least 50,000 specimens in the Museum's collections came from private ranches! Of the approximately 31,000 catalogued specimens that came from non-federal or non-state lands, the majority have been collected on and donated by the seven ranches described above.

Ranchers who are interested in making fossils found on their land available to the public can receive significant tax breaks for the value of the donated specimens. An additional benefit is derived from knowing that the fossils will stay in the region and also can be studied for their scientific significance. Lastly, but perhaps most importantly, such specimens will be maintained in the public domain in South Dakota for future generations to study and enjoy.

Individuals interested in learning more about establishing paleontological partnerships with SDSM&T's Museum of Geology can contact the Museum at 1-800-544-8162, ext. 2467 or call Dr. James Martin directly at (605) 394-2427. ✂



"Fossilier's Hunting Haven Sublime, Almost" (by Suzanne Graves) depicts some of the fossils found on the Graves' ranch.

walk the earth is displayed for public viewing on the SDSM&T campus. Since being placed on display, hundreds of thousands of individuals—including countless school children from throughout western South Dakota—have viewed the *T. rex* skull, thereby gaining an authentic glimpse into prehistoric life when these ferocious beasts roamed the land.

The Flodens have been generous

Up, Up, & Away

continued from page 11

temperatures, but also has coolant fluids frequently being applied. "This can create a nasty environment for analysis," adds Dr. Jenkins.

With support from South Dakota's EPSCoR (Experimental Program to Stimulate Competitive Research) program, this project is one of the first research projects being undertaken by SDSM&T's Center for Advanced Manufacturing and Production (CAMP). The research is designed to improve machining and manufacturing processes for industries in South Dakota, which could provide some direct benefits to the state's manufacturers and producers.

"The Compliant Structures Laboratory provides me with a unique opportunity to get hands-on experience with state-of-the-art equipment," states David Fitzgerald.

Graduate student Mahesh Tampi is focused on investigating whether there are ways to control a membrane in a local region of an entire structure. He is developing a potential method for system identification based on the parameters or values of certain features. Local vibration probing methods may be one way to determine these qualities. Tampi's research is sponsored by the Jet Propulsion Laboratory. "I've always been fascinated with NASA," says Tampi when asked what sparked his interest in this particular field of research.

Another CSL project currently in progress involves computational modeling of parachutes as they inflate. This research will result in a better understanding of the stresses and forces that are at work as parachutes open. This work is being done by Xinxiang Liu, a Ph.D. candidate in Materials Engineering and Science. The Army Research Office in cooperation with the University of Connecticut is supporting this project.

Many SDSM&T undergraduates have also had opportunities to gain valuable experience in the Compliant Structures Laboratory. Undergraduates currently working as research assistants in the lab, include one Mechanical Engineering major and one Metallurgical Engineering student.

From precision membranes to parachutes to high-altitude scientific balloons, the CSL puts SDSM&T on the leading edge of space-age research. As the advent of the 21st century arrives, the tests being conducted on the South Dakota Tech campus today will help produce the high tech, flexible structures in the outer space of tomorrow. ✂

CAMPUS BRIEFINGS

Dr. Lidvin Kjerengtroen, Professor of Mechanical Engineering, and **Dr. Jon Kellar**, Assoc. Professor of Materials & Metallurgical Engineering, gave a presentation entitled "Development of a Fiber-Optic Sensor for Total Lifetime Monitoring of Polymer Matrix Composites" at Wright-Patterson Air Force Base, Dayton, OH. **Dr. Kjerengtroen** also taught a three-day seminar on Probabilistic Methods in Design in Detroit, MI and conducted a similar seminar at Ford Motor Company in September.



Dr. Srinivasa Iyer, Professor of Civil & Environmental Engineering, has been designated as an American Society of Civil Engineers

(ASCE) Fellow, which is one of the highest professional recognitions that civil engineers can receive from their peers.

Dr. Susan L. Reid, Asst. Professor of Music and Director of Choral Activities, published an article entitled "The Twenty-One SSATB Vocal Works of Dietrich Buxtehude: An Annotated Bibliography" in *The Choral Journal* (November 1998) and also an article entitled "The Changing Face of Native American Music" in the *International Choral Bulletin* (July 1998). **Dr. Reid** was promoted this summer to the position of researcher at the British Archives of Recorded Sound where she has worked since 1990.

SDSM&T exempt employees recognized for years of service to the State of South Dakota include **Bob Reznicek**, Physical Plant Director (35 yrs); **Marge Marken**, Manager of Budgets (30 yrs); **Sandy Fischer**, Director of Business Services (25 yrs); **Dr. Richard Gowen**, President (20 yrs); **Barb Dolan**, Coordinator of Academic Support (10 yrs); **Marv Lorenz**, Network Manager (10 yrs); and **Bryan Schumacher**, Assistant Director of Instructional Technology Services (10 yrs).

SDSM&T faculty members attended the ASME 1998 International Mechanical Engineering Congress and Exposition in Anaheim, CA. **Dr. Sanjeev Khanna**, Asst. Professor of Mechanical Engineering, presented a paper entitled "Residual Stress Measurement in Spot Welds and the Effect of Fatigue Loading Using High Sensitivity Moire Interferometry", co-authored by Canlong He, Univ. of Missouri -

Rolla, and Hari N. Agrawal, Ford Motor Co. **Dr. Christopher Jenkins**, Professor of Mechanical Engineering, presented a paper entitled "Adaptive Shape Control of Precision Membrane Antennae and Reflectors" co-authored by **Dr. Vojislav Kalanovic**, Assoc. Professor of Mechanical Engineering; and **S.M.Q. Faisal**, **Kanthimani Padmanabhan**, and **Mahesh Tampi**, SDSM&T graduate students. **Dr. Robb Winter**, R.L. Sandvig Professor of Chemical Engineering, presented a paper titled "Interphase Nanomechanical Properties in Polymer Matrix Composites as Measured by Interfacial Force Microscopy" co-authored by J.E. Houston, Sandia National Laboratories.

Dr. James E. Fox, Professor and Chair of Geology & Geological Engineering, co-authored an article entitled "Petrophysical evaluation of low contrast/low resistivity Middle Jurassic valley-fill reservoirs, Powder River Basin, Wyoming" published in *The Journal of the Canadian Well Logging Society* (Vol. 21, 1998).

Traditions of Excellence Award recipients are **Floyd Straw** and **Sherrill Selwyn**, Custodial Crew Leader and Custodial Worker, Minerals Industries Building, Physical Plant (October); **Deanna Edwards**, Secretary, Dean of Students Office (November); and **Vi Stoltz**, Senior Secretary, Vice President's Office (December).

Dr. Nohpill Park, Asst. Professor of Elec. & Computer Engineering, presented a paper entitled "Concurrent Fault Detection in Reconfigurable Virtual Multistage Network" at the recent International Test and Evaluation Association, 98 Modeling and Simulation Workshop in Las Cruces, NM. **Dr. Park** also chaired a session of Test Synthesis at the 1998 International Test Conference in Washington, DC.

SDSM&T staff members who completed the Outstanding Student Services training or refresher course include **Marcia Bawdon**, Sales Clerk, Bookstore; **Brenda Brown**, Secretary, Grad. Ed & Sponsored Programs; **James Hartman**, Systems Programmer, Instructional Technology Services; **Katheryn Herting**, Custodial Worker, Residence Life; **Tim Kellar**, Building Maintenance Specialist, Physical Plant; **Marsha King**, Custodial Worker, Residence Life; **Kata McCarville**, Director, Instructional Technology Services; **Qixu Mo**, Research Scientist I, Institute of Atmospheric Sciences; **Ruby Nickels**, Custodial Worker, Residence Life; **Vonnie Paulson**, Teacher Aide, Little

Miner's Clubhouse; **Debra Richards**, Secretary, Math & Computer Science; **Rita Sabe**, Secretary, Industrial Engineering/CAMP; **Darrell Sawyer**, Public Information Manager, Univ. & Public Relations; **Heather Schilling**, Director of SKILL; **Rachel Schofield**, Publications Manager, Univ. & Public Relations; **Sherrill Selwyn**, Custodial Worker, Physical Plant; **Floyd Sperlich**, Custodial Worker, Physical Plant; **Norma Stead**, Custodial Worker, Residence Life; **Gene Towner**, Custodial Crew Leader, Physical Plant; **Shelly Youngblood**, Child Care Worker, Little Miner's Clubhouse; and **Kristi Wishard**, Senior Secretary, Univ. & Public Relations.



Dr. V. Ramakrishnan, Distinguished Professor of Civil Engineering, moderated a forum entitled "Why or Why not Fiber Reinforced Concrete?" at the American Concrete Institute Fall Convention in Los Angeles. He also presented an invited paper entitled "Synthetic Fiber Reinforced Concrete for Seismic Applications" co-authored by **Ramabhadran Sivakumar** (MS CE '95) and based on research done at SDSM&T.

Dr. Donald Teets, Chair and Assoc. Professor of Math & Computer Science, and **Dr. Karen Whitehead**, Vice President for Academic Affairs, co-authored an article entitled "Computation of Planetary Orbits" published in *The College Mathematics Journal* (Vol. 29, November 1998).

Drs. Edward Corwin and **Antonette Logar**, Professor and Assoc. Professor respectively of Math & Computer Science and Computer Engineering, and co-author W.J.B. Oldham published a paper entitled "A Proof of the Non-existence of a Bounded-Derivative Continuous Model for a Discrete Chaotic System" in *Neurocomputing* (Vol. 20, 1998).

Dr. Michael Day, Assoc. Professor of English, was the keynote speaker and led the online discussion for "Teaching and Learning in Cyberspace," an online conference sponsored by The Collaboration for the Advancement of

College Teaching and Learning. **Dr. Day** also published a chapter called "Writing in the Matrix: Students Tapping the Living Database on the Computer Network" in *The Dialogic Classroom: Teachers Integrating Computer Technology, Pedagogy, and Research*.

Dr. Vojislav Kalanovic, Assoc. Professor of Mech. Engineering, presented an invited paper at the IEEE Conference on System Man and Cybernetics in La Jolla, CA, entitled "Control of Membrane Wrinkling Via Intelligent Control Strategies" co-authored by **Dr. Christopher Jenkins**, Professor of Mechanical Engineering.

Dr. Sherry Farwell, Dean of Graduate Education & Sponsored Programs, participated as one of 23 panelists for the final review and selection of proposals for new national Science & Technology Centers being sponsored by the NSF's Office of Integrative Activities.

Dr. Judy Sneller, Assoc. Professor of English, presented a paper at the Rocky Mountain Modern Language Association (RMMLA) meeting in Salt Lake City entitled "From 'Texas Buster' to 'Southern Lady': The Humor of Mollie Moore Davis." **Dr. Sneller** also was elected Co-Secretary of the RMMLA's Western and Southwestern Literature Section for 1999.

During the American Institute of Chemical Engineers Annual Meeting, **Dr. Jan Puszynski**, Professor of Chemical Engineering, presented a paper entitled "Gas-Transport Enhancement During Combustion Synthesis of Silicon Carbide and Alpha-Sialons" co-authored by SDSM&T graduate students **Shuxia Miao** and **Rahul Korlahalli**. **Dr. David Dixon**, Assoc. Professor of Chemical Engineering, and **Dr. Puszynski** presented a paper entitled "Introduction of Design and AspenPlus Across Chemical Engineering Curriculum" co-authored by **Dr. Larry Bauer**, Professor of Chemical Engineering. **Dr. Puszynski** also chaired the technical session "High Temperature Non-Catalytic Reacting Systems." Graduate student **Ravindra Kharde** presented a research poster "Polymer Surface Modification by Supercritical Fluid-Assisted Impregnation" co-authored by graduate student **Xiaodong Zhang**, and **Drs. Robb Winter** and **Dixon**.

Dr. Bruce Berdanier, Asst. Professor of Civil & Environmental Engineering, was one of ten participants in the "Reading Dads Program" at Corral Drive Elementary School recognized by the Rapid City Board of Education for receiving the "Helping Hands Award" from the School

Administrators of South Dakota.

During SDSM&T's winter commencement, **Doug Aldrich** (ChemE '62, MS ChemE '68), Midland MI; **Jim Christensen** (GenE '57), Rapid City; **Bob Flint** (MetE '37), Pittsburgh PA; and **Tom Malone** (GenE '40), Hartford CT, were honored as the first recipients of the newly established SDSM&T Distinguished Alumni Award.



Spotlight on Students

Ryan Caldwell (ChE, sophomore, Sioux Falls), **Robert Cunningham** (ChE, sophomore, Mitchell), **Terry Klein** (ChE, junior, Rapid City), **Travis Nelson** (ChE, junior, Lake Norden) and **Aaron Podraza** (ChE, senior, Hitchcock) presented their "Aqua Switch" project at the American Institute of Chemical Engineers (AIChE) National Student Chapters Competition. SDSM&T's chapter was one of five (out of 150 nationwide) chosen to participate in the new competition.

The **Alpha Delta Pi Sorority** raised over \$600 for the Ronald McDonald House through a creative "I Spy an AD Pi" fundraiser in which 38 members participated. Selling 125 water guns for \$5 each, the sorority members wore T-shirts with special targets on the back. Prizes donated by local businesses were awarded to the students who "hit the target" with their water pistols.

Benni Westgor (Geol, freshman, Neenah WI), president of Students Against Driving Drunk (SADD), and SADD sponsor **Jolie McCoy**, Director of Counseling Services, participated in the Drunken & Drugged Driving Community Planning event held recently at Rapid City Regional Hospital. Students from all four local high schools and several middle schools also attended the statewide teleconference designed to gather student ideas on preventing drunken and drugged driving. Benni described SDSM&T's Designated Driver program and other alcohol awareness projects.

Quarterly 23 SDSM&T

During the recent Upper Midwest Region Conference of the National Association of Campus Activities, SDSM&T's **TONITE** students won the award for most outstanding delegation with seven or fewer members that participates fully in all aspects of the conference. **Ben Simpson** (ME sophomore, Buffalo Gap) and **Nathan Sorben** (CEE junior, Wessington Springs) were recently elected as the new president and vice president of TONITE.

Students whose art work was displayed in the **SDSM&T Apex Gallery's Student Drawing & Perspective Exhibition** included **Desmond Allen** (IS, freshman, Black Hawk); **Kelly Combs** (IS, sophomore, Rapid City); **Cody Deranleau** (CENG, freshman, Newell); **Samuel Fischer** (IS, freshman, Rapid City); **Darryn Frafford** (CENG, freshman, Halliday ND); **Tanya Gillespie** (IS, freshman, Rapid City); **Michael Haeder** (Chem, senior, Rapid City); **Sarah Jones** (Science, freshman, Rapid City); **Luke Jordan** (EE, freshman, Wagner); **Matthew Moore** (CENG, freshman, Rapid City); **Wanda Nelson** (Science, senior, Rapid City); **Micah Odahlen** (Science, freshman, Rapid City); **Rebecca Palmer** (CSc, junior, Longmont CO); **Brian Pinon** (Engineering, freshman, Gillette WY); **Jennifer Ray** (ME, sophomore, Rapid City); **Donnie Slag** (CEE, freshman, Dickinson ND); **Phillip Thompson** (GeoE, sophomore, Rapid City); and **Jenny Vytalil** (IS, sophomore, Box Elder).

Gail Samuels (Met, senior, Rapid City) was awarded the 1999 Extraction and Processing Division Scholarship for \$2,000 from The Metals, Materials, and Minerals Society. She also was named a 1998 ASM Foundation Scholar by the Materials Information Society.

The **Tau Beta Pi South Dakota Alpha Chapter** was awarded a \$500 scholarship from the Tau Beta Pi Association. SDSM&T's chapter was one of only eleven (out of 220 in the nation) to be awarded the scholarship for earning the Secretary's Commendation for outstanding documentation for three years in a row.



You Are Invited . . . Calendar of Events

For information on these events contact University and Public Relations at (605) 394-2554.

JANUARY

FRIDAY, JANUARY 15

6 & 8pm Home Men's & Women's Basketball
Games against Huron University

SATURDAY, JANUARY 16

6 & 8pm Home Men's & Women's Basketball
Games against Dakota State University

MONDAY, JANUARY 18

Martin Luther King, Jr. Holiday

TUESDAY, JANUARY 19

Noon United Campus Ministry Forum
"Lessons From Birmingham Jail"

FRIDAY, JANUARY 22

Men's & Women's Basketball Games at
Mount Marty College
United Campus Ministry Retreat

SATURDAY, JANUARY 23

9am Rapid City Chamber Crackerbarrel
Men's & Women's Basketball Games at
Dakota Wesleyan University

TUESDAY, JANUARY 26

Noon United Campus Ministry Forum
"Is All the News Still Fit to Print?"

WEDNESDAY, JANUARY 27

6 & 8pm Home Men's & Women's Basketball
Games against Black Hills State
University

SATURDAY, JANUARY 30

9am Rapid City Chamber Crackerbarrel

FEBRUARY

TUESDAY, FEBRUARY 2

Noon United Campus Ministry Forum
"APOCALYPSE 2000"

FRIDAY, FEBRUARY 5

6 & 8pm Home Men's & Women's Basketball
Games against Dordt College

SATURDAY, FEBRUARY 6

9am Rapid City Chamber Crackerbarrel
6 & 8pm Home Men's & Women's Basketball
Games against University of Sioux Falls

TUESDAY, FEBRUARY 9

Noon United Campus Ministry Forum
"Can Morality be Maintained Without
Religion?"

THURSDAY, FEBRUARY 11

Valentine's Health Fair

FRIDAY, FEBRUARY 12

Men's & Women's Basketball Games at
Dakota State University

SATURDAY, FEBRUARY 13

Men's & Women's Basketball Games at
Huron University

SUNDAY, FEBRUARY 14

Valentine's Day

MONDAY, FEBRUARY 15

President's Day Holiday

TUESDAY, FEBRUARY 16

Noon United Campus Ministry Forum
"Doctors can be Angels Too, A
Venezuelan Venture"

FRIDAY, FEBRUARY 19

2:15 pm Bridge Strength Testing
Civil/Mechanical Room 210
6 & 8pm Home Men's & Women's Basketball
Games against Dakota Wesleyan
University

FRIDAY - SATURDAY, FEBRUARY 19 - 27

Engineers Week

SATURDAY, FEBRUARY 20

9am Rapid City Chamber Crackerbarrel
10am Kid's Block Contest
Surbeck Center Ballroom

6 & 8pm Home Men's & Women's Basketball
Games against Mt. Marty College

MONDAY, FEBRUARY 22

3pm Colloquium Speaker - Dr. Ray Hyman
"How Smart People Go Wrong"
7pm "How We Are Fooled"
Surbeck Center Ballroom

TUESDAY, FEBRUARY 23

11:30 am Buffet Luncheon
Surbeck Center, Bump Lounge
Noon United Campus Ministry Forum
"Ask an Engineer?"
A Panel: Facilitated by engineers fielding
forum questions from students, faculty,
and community
3-5pm Rube Goldberg Contest
Surbeck Center Ballroom

WEDNESDAY, FEBRUARY 24

4-6pm "Anything Goes" Contest
Surbeck Center Ballroom
Men's & Women's Basketball Games at
Black Hills State University

THURSDAY, FEBRUARY 25

11am-1pm Recognition of Outstanding Recent
Graduates, Proclamation of Engineers
Week - Mayor Jim Shaw, The Order of
the Engineer Initiation
Surbeck Center Ballroom

FRIDAY, FEBRUARY 26

11am "The Miracles of Chemistry"
Surbeck Center Ballroom
12-1pm Sack lunch with college students in
departments
1-3:30pm Experiments/displays in the
departments
3-5pm "Grubby Number One" Contest
Surbeck Center Snack Bar
6pm Annual Engineers Week Banquet
Surbeck Center Ballroom

SATURDAY, FEBRUARY 27

9am Rapid City Chamber Crackerbarrel
9:30am- Computer Programming Contest
3:30pm Electrical/Physics Bldg, Room 342
1pm Mathcounts
Classroom Building, Room 204
TBA SDIC Playoffs

MARCH

MONDAY, MARCH 1

TBA SDIC Championships

TUESDAY, MARCH 2

Noon United Campus Ministry Forum
"Heated Debate - Cool Heads"

FRIDAY, MARCH 5

Concrete Conference

MONDAY - FRIDAY, MARCH 8 - 12

Spring Break

WEDNESDAY - TUESDAY, MARCH 10 - 16

TBA National NAIA Tournament

SATURDAY, MARCH 13

Odyssey of the Mind

MONDAY, MARCH 15

Classes Resume

TUESDAY, MARCH 16

Noon United Campus Ministry Forum
"Why Get Married?"
6pm Career Service Banquet

THURSDAY, MARCH 18

8am-Noon CAAP Testing

FRIDAY, MARCH 19

High Plains Regional Science Fair

MONDAY, MARCH 22

8am-Noon CAAP Testing

TUESDAY, MARCH 23

Noon United Campus Ministry Forum
"Holy Work, Holy Land"
12:30pm- CAAP Testing
4:30pm

TUESDAY, MARCH 30

Noon United Campus Ministry Forum
"Political Science is an Oxymoron"
Honors Convocation

APRIL

FRIDAY, APRIL 2

Good Friday - No Classes

MONDAY, APRIL 5

Easter Holiday

TUESDAY, APRIL 6

Noon United Campus Ministry Forum
"Chief, Here's an Unlimited Budget"

TUESDAY, APRIL 13

Noon United Campus Ministry Forum
"The Trust Factor: Regents vs. Faculty"

FRIDAY & SATURDAY, APRIL 16 & 17

Multicultural Exposition

TUESDAY, APRIL 20

Noon United Campus Ministry Forum
"It's Not the Oil-It's Water"
SDSM&T Senior Design Fair

WEDNESDAY, APRIL 21

Secretary's Day

FRIDAY, APRIL 23

South Dakota Space Day
Black Hills State University

SATURDAY, APRIL 24

7:30pm Spring Choir Concert

TUESDAY, APRIL 27

Noon United Campus Ministry Forum
"Challenges in a Pluralistic Society"

MAY

MONDAY - FRIDAY, MAY 3 - 7

Finals Week

SATURDAY, MAY 8

Commencement

MONDAY, MAY 10

West River Math Contest

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(605) 394-2554.*

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each (printing costs only).*



Did you know...

- In 1899, the School of Mines organized the first expedition to the Badlands.
- The National Smelting Company built a smelter south of campus in 1901. After a short operating life, the smelter stack was torn down prior to 1920, but the smelter base remained on "Smelter Hill" until the mid-1960's, serving as a graffiti signboard for rival Mines fraternities.



- In 1904, South Dakota School of Mines received the grand prize at the World's Fair in St. Louis in recognition for the high quality of two large relief maps of the Black Hills. In addition, the school received a diploma and a gold medal for its exhibit of Black Hills minerals, ores and fossils.
- The football team began calling itself the "Hardrock Men" in 1913. The little girl in the photo is Helen McManus, the team's mascot.



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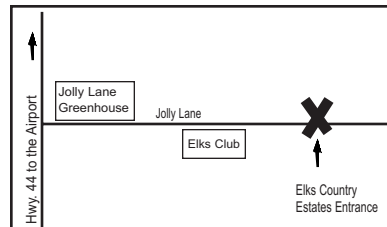
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