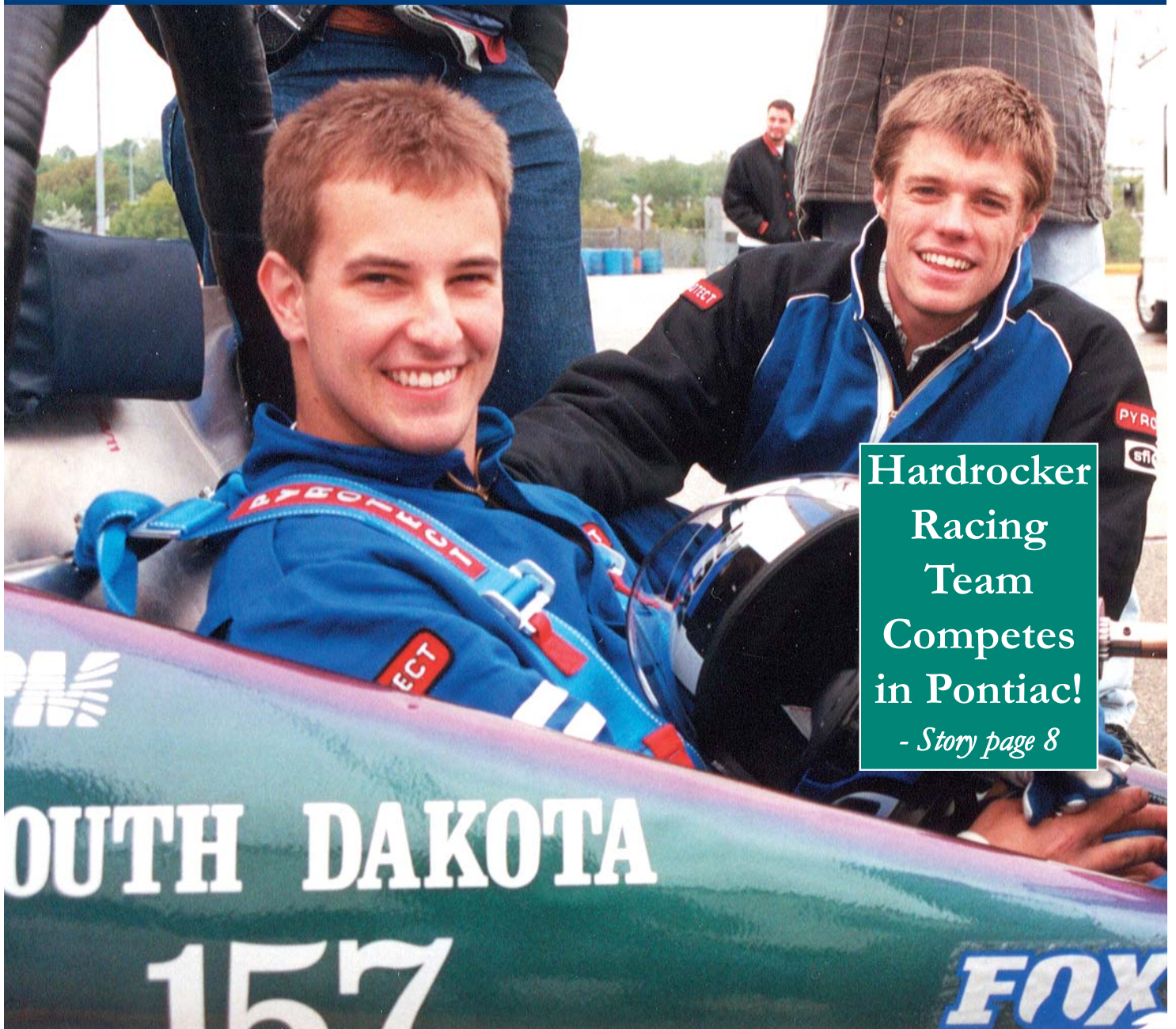


SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY QUARTERLY

SUMMER 2000



**Hardrocker
Racing
Team
Competes
in Pontiac!**

- Story page 8

A PUBLICATION OF SDSM&T

Perspectives



Dear Friends,

There are exciting new opportunities for learning with the impressive access to the Internet available to students in our schools and universities. As one of the Commissioners of the Congressional Web-Based Education Commission, I have the opportunity to gain a broad perspective of the many advances now available across the nation and the world. I am pleased to report that South Dakota is leading the nation in developing Internet educational access.

Through the vision of Governor Janklow, students in all the schools and universities have high-speed access to the Internet. Nearly 30% of all K-12 teachers and administrators have received special training in the use of this unique state system to enhance learning. The classrooms, laboratories, and residence halls of SDSM&T and all the other public universities also have high-speed connections to the Internet. More than 20% of our university faculties have received summer support to develop materials delivered through the Internet to improve our traditional courses.

The new Board of Regents Electronic University Consortium (EUC) provides access to a wide range of courses delivered by the six regental universities through the Internet. There will be continuing growth of the number of degree programs available for completion over the Internet.

This exceptional commitment to providing access to the Internet brings new meaning to the process of providing equal educational opportunities to all people. Through unique software and network capabilities available at SDSM&T we now have the ability to empower each learner to develop to the full measure of their individual potential. There is increasing need to assist students to become better prepared in the fundamental areas of mathematics, English and science that are vital for continued economic growth. The access to the resources now available in South Dakota offer powerful new ways to enhance the learning of each student in such critical fundamental areas of education.

In May 2000, SDSM&T entered into a partnership with the Rapid City School District to use the software developed at SDSM&T, in conjunction with the improved access to the resources available through the Internet, to enhance the learning of all students. A pilot project to refine the process of expanding the capabilities of our traditional elementary and secondary classrooms will begin this fall with the expectation of broad application within a year.

The ultimate affect of these many developments in the application of technology to improve education is the development of opportunities for new industries and businesses in the cities and towns of South Dakota. It is a great pleasure to thank and congratulate Governor Janklow and all others who have worked together to provide this exciting new opportunity for the future of South Dakota.

Sincerely,

Richard J. Gowen, President

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY QUARTERLY

Summer 2000

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

MASTER OF SCIENCE DEGREES

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

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.

ALL-AMERICAN'S LATEST SHOT REACHES INTERNATIONAL SPACE STATION

Sixteen nations are currently undertaking a project so daunting that one alone could not tackle. More than 100,000 people in space agencies and companies around the world are pooling their knowledge to develop the largest and most complex international scientific project in history. The International Space Station will be NASA's first permanent space habitation. Its impact will extend beyond our current and imaginable knowledge in fields from materials to computer technology, and an alumnus of the South Dakota School of Mines & Technology is involved.

Brian Goetsch (ME '98) is a mechanical engineer working for the Boeing Company. He recently was transferred to Houston, Texas where he works in thermal control system analysis with the International Space Station. Brian is located at NASA's Johnson

Space Center where he works every day with computer simulations of the International Space Station. His team's objective is to maintain room temperature of the whole system where astronauts will be living and working.

"Right now we are trying to run as many computer simulations as we can and try to figure out if a problem occurs, such as a hose leaking or pump shutting off, what steps need to be taken to solve the problem," said Goetsch. "We are trying to take a proactive look at the thermal control system so that we will be ready when astronauts are up there. We need to be ready to solve problems without waiting," he added.

Brian, a native of Milbank, South Dakota, grew up with dreams of one day working for the space program. His success as an athlete in high school and college helped prepare him for his current career. Hard work and goal setting were characteristics instilled upon Brian as he began competing competitively in track and field in eighth grade. His dedication proved worthwhile his senior year when he became the South Dakota State champion in both the shot put and discus events.

Upon graduation from high school Goetsch knew he wanted to pursue engineering. Attracted by the area and his ability to participate on both the football and track and field teams, he chose to attend the South Dakota School of Mines & Technology.

"When I came to Tech the most I had ever dreamed of was to be an academic All-American, receive all-conference recognition in football, and compete in the national competition in track just once," said Goetsch. "At the end of my four years of competing in college I had accomplished and surpassed this, and it felt incredible."

Brian achieved success both on and off the field while pursuing his mechanical engineering degree. As a defensive lineman for the Hardrocker football team he was named all-conference, 1997 co-defensive player of the year in the SDIC Conference, and honorable mention All-American. As a track athlete he competed in the NAIA national competition five times (three outdoor competitions and two indoor competitions) in which he qualified in the shot put each time. Goetsch was a three-time All-American shot-putter finishing third at the 1996 outdoor championships, second at the 1997 indoor championships, and second at the 1997 outdoor championships, and was named an Academic All-American* in 1996 and 1997.

*[To become an Academic All-American you must have a 3.5 GPA or above.]

Photo courtesy of Tech Athletics



Brian Goetsch competed in the NAIA national competition five times during his athletic career at South Dakota School of Mines and Technology.

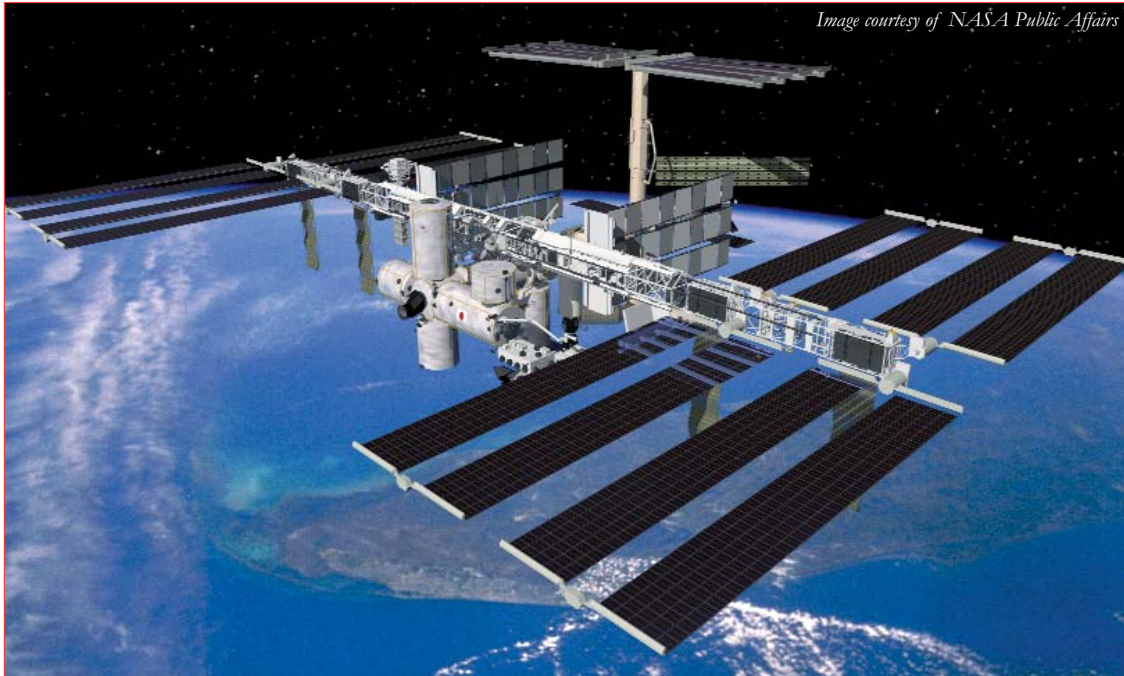


Image courtesy of NASA Public Affairs

“Brian was a hard working and dedicated athlete,” said SDSM&T Track and Field Coach Jerry Schafer. “He was always intense about school work and being a better athlete. He was very focused and had goals he wanted to achieve, and did achieve.”

“The experience I gained through competing in the shot and discus helped prepare me to be successful after college,” said Goetsch. “By setting goals and working hard to reach them I learned discipline. It is difficult to take the time to work out and to lift and eat right, all which are necessary to compete competitively, while trying to maintain the grades. It is very easy to want to relax and not push yourself. By being disciplined it helped me to realize that I can achieve the goals that I set and that gave me a lot of confidence.”

After college Goetsch went to work for Boeing in Seattle, Washington. His career has been anything but dull as Brian has worked on both the AWACS and F-22 airplanes. The AWACS (airborne warning and control system) aircraft provides all-weather surveillance, command, control, and communications needed by air defense forces, and the F-22 Raptor is the most capable, affordable, maintainable and lethal fighter aircraft the U.S. Air

Force has ever had. Despite the grandeur of the AWACS and F-22, Goetsch was initially intimidated at the possibility of working with the International Space Station.

“I was both excited and intimidated when I saw there was an opening to work with the International Space Station because trying to get on something like the space program is a very difficult thing to do,” said Goetsch.

“When I applied I thought I had at best a 50/50 chance of getting the position. Once I was selected it was only six weeks later that I was in Houston. My first day on the job I was very excited and nervous and by the end of the day very overwhelmed with the magnitude of the engineering involved on this project.”

Brian began working at Johnson Space Center in February 2000. Most of his time is spent troubleshooting temperature control problems that could arise on the Space Station using computer simulations. In August he will travel to Kennedy Space Center in Florida where the main parts of the Space Station are located, and he will be able to witness testing of the components.

The first two components of the Space Station, Unity and Zarya, were launched in 1998. The Space Station currently completes one rotation around the earth once every 92 minutes, 24 seconds at a speed of 17,000 mph. When complete the Space Station will have a mass of about one million pounds and will measure 361 feet across and 290 feet long – the length of a football field including the end zones.

Expedition 1 is scheduled for launch no earlier than October 30, 2000 when the Russian-built Soyuz TM space capsule and a crew of three will be carried and dock two days later at the Space Station. The crew will stay for approximately five months and will mark the first time individuals have lived in a permanent space habitation.

Once complete and manned by astronauts, the International Space Station will continue to require the support of hundreds of thousands individuals back on Earth. Brian will work to ensure the thermal control system is working appropriately, and if he has his way will eventually work his way to the Mission Operations Directorate helping directly support the Space Station and future space program missions. In the meantime, Brian would like to continue his involvement in athletics. He has taken up rugby and would like to eventually coach track and field.



Photo courtesy of Brian Goetsch



Brian Goetsch

NEW TECHNOLOGIES UNLOCK PALEO REPOSITORY TO PROVIDE

Since the inception of the Museum of Geology in the late 1800's, the Museum has been a regional epicenter in paleontology, geology, and mineral research. It began with a donation of Mr. G. E. Bailey's mineral and fossil collection including more than 5,000 specimens, forming the core of the collections for many years.

Today the Museum operates as a teaching and research facility with collections of more than 250,000 vertebrate fossils and 6,000 minerals. Still known as an epicenter for research, the Museum boasts a staff that is renowned across the country for their expertise. In recent years, these individuals have begun to utilize the technological resources available at the South Dakota School of Mines & Technology to further expand their research capabilities.

The increased popularity of dinosaurs and other prehistoric creatures over the last few years, coupled with new technologies, has inspired the concept of a paleontological service center to bring these creatures to the world public for research and educational purposes. Utilizing current and future technologies can provide the key to many answers that affect our daily lives. The establishment of a fossil database made available to the world community would allow such problems as global warming, stability of species, climatology, and the extinction of our species, to be addressed.

It is for these reasons that the South Dakota School of Mines & Technology and the Museum of Geology have proposed the development of a regional research and service center on the campus of the School of Mines.

"The repository and service center is our opportunity to preserve the past for everyone's future," said Dr. James Martin, Professor and Curator of Vertebrate Paleontology. "The technological advances and capabilities will allow us to extract and disseminate information heretofore impossible in the paleontological realm."

"It is incumbent upon those of us who are living at the present time to be good stewards of the resources available to us. We must preserve and care for the specimens available for study," said Dr. Mark Gabel, Professor of Biology, Black Hills State University. "In my career... I have observed an astounding change in the techniques available to researchers. Methods including stable isotope analyses, analysis of ancient DNA, and sophisticated chemical analyses were not known 20 years ago. We must keep the specimens in prime condition for new techniques that will be developed by the next generations of researchers... It is with great enthusiasm that I support the proposed repository...in western South Dakota."

SDSM&T proposed a demonstration/planning project to the US Department of the Interior. The purpose of the project is to document the feasibility of developing a regional paleontological research and service center.

The key components of the demonstration/planning project are to 1) identify the best multidisciplinary practices for the conservation and preservation of the specimens; 2) identify the best practices and projected advances in the use of high technology instrumentation to characterize the specimens. This technology would include but is not limited to high-resolution, three-dimensional imagery; microscopic CT scans; computer imaging; and advanced geochemical compositional analyses. 3) Identify the best practices for the creation of an electronic conservation and preservation network using the Internet and Internet II to link museums, agencies, educators, and the general public to enhance sharing of advanced information. The Internet would be used to disseminate derived virtual specimens and their accompanying contextual data in order to make paleontological resources broadly available. 4) Identify the best practices for the exact replication and distribution of the specimens for research and education. 5) Evaluate the results of the project and make recommendations for further project



File photo

*This is a painting of saber-tooth cats, which is displayed at the Museum of Geology. The painting was inspired by a *Nimravus* specimen, also displayed in the Museum.*

ROCK PREHISTORIC SECRETS KEYS TO PREDICTING OUR FUTURE

development including the identification of appropriate equipment and facilities to establish a paleontological service center to serve national and regional scientific and educational needs.

Paleontology dates back more than one hundred years when the first researchers utilized picks and shovels to uncover fossilized remains.

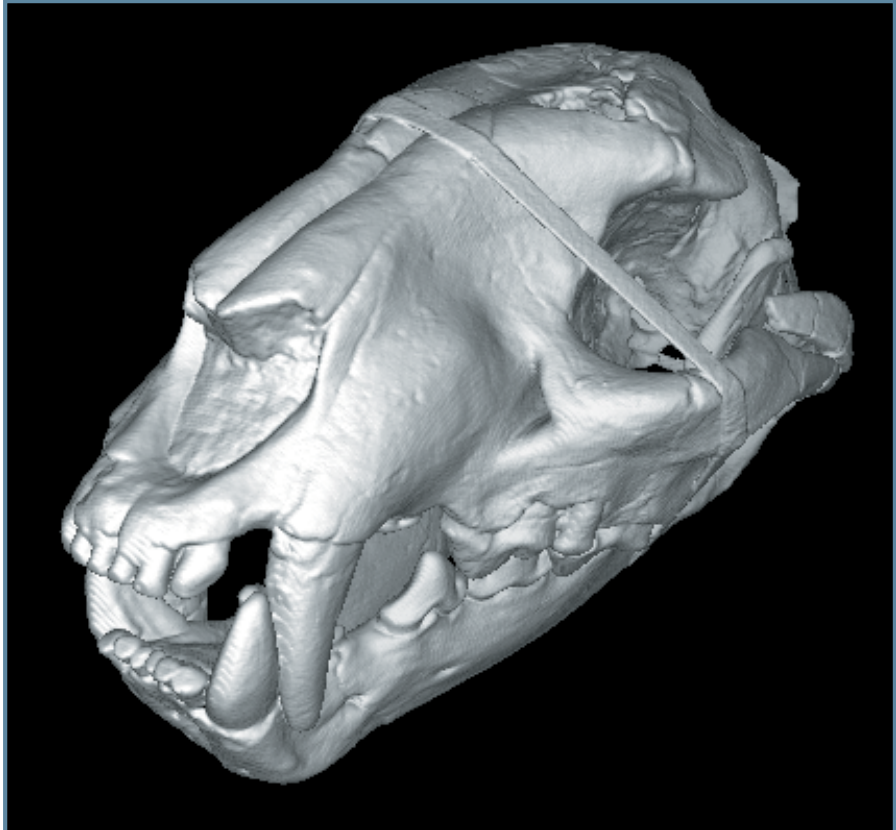
Technological advances, many from industry and the medical community, have brought this profession into the 21st century benefiting from such things as scanning electron microscopes, ship-mounted drill rigs, and computers, yet the researchers' pick and shovel are still an essential part of any field dig.

While continuing to employ age-old techniques, the assistance of technology will help predict our future. Results, techniques, and technologies of the proposed project will result in a model for a web-based paleontological database. The database will allow researchers throughout the region and the world to share information, learn from each other, and benefit from work taking place hundreds and thousands of miles away.

Rapid City Regional Hospital has provided in-kind support in the form of specimen scanning for this proposed demonstration project. Additionally, SDSM&T would provide computing resources including Internet II connections, hardware, and software, in addition to administrative and technical support. The university would also make available access to the High Priority Connection Internet software developed on campus.

SDSM&T is the only collegiate institution in the United States offering a masters degree in paleontology, and the Museum of Geology serves as a steward of one of the largest such collections in the world. Given that the study of paleontology is reliant upon museum collections, it is only appropriate that a regional center be established to accompany this tremendous resource.

The research and service center would further enhance the Museum's operations that center around four activities represented by the acronym ACRE. These activities include Acquisition,



This is a CT Scan image of the skull of Nimravus, a cat-like mammal. New CT imaging allows for more in-depth examination of paleo specimens. This image was created by Dr. William Capehart provided by CT Scan courtesy of Rapid City Regional Hospital.

Curation, Research, and Education. A regional repository would attract researchers and amateur paleontologists alike, augmenting an increase in acquisition, curation, and research. The fourth element, education, would be addressed through the establishment of a paleontological database, accessible by individuals worldwide.

As a nationally recognized center of paleontology, the Museum of Geology is poised to take advantage of the technological advances time has brought, and establish a regional research and service center at the South Dakota School of Mines & Technology. The establishment of such a center will better preserve the tens of thousands of rocks, minerals, and fossils within the existing Museum collections so that we can learn from the past and better predict our own future.



Simply the Best! Providing excellence in engineering and science education since 1887.

The South Dakota School of Mines & Technology (SDSM&T) received a prestigious award this past May solidifying the university and its programs as one of the best in the country. The Center of Excellence for Advanced Manufacturing and Production (CAMP) at SDSM&T was recognized with the 2000 Boeing Outstanding Educator Award. The other two finalists for the award were Brigham Young University, and Purdue University.

"A lot of things went through my mind when we got the call on May third," said Dr. Dan Dolan, Director of Academic Programs, CAMP. "Elation, disbelief, certainly a lot of happiness.

"I was in the middle of administering an oral exam to a master's student," said Dr. Michael Batchelder, Executive Director, CAMP. "They broke in on the exam and told me, and I can tell you that after that great news the questions for the exam got a lot easier!"

The Boeing Outstanding Educator Award recognizes and rewards faculty who have made outstanding contributions to undergraduate engineering education. The Boeing Company has a vested interest in the quality of education engineers are receiving as many are recruited and hired by the company itself. Thus, Boeing has made a commitment at the national level to recognize faculty for their remarkable quality of teaching through the Outstanding Educator Award.

CAMP was nominated for the award by Dr. Batchelder, Dr. Dolan, and Dr. Srinivasa Iyer, Director of Industry Programs, CAMP.

"I am very proud of the efforts of the CAMP Directors in their preparation of the winning proposal for the Boeing Outstanding Educator Award," said Dr. Wayne Krause, Dean, College of Systems

Engineering. "They are an exceptional team and exemplify the traditions of excellence at SDSM&T."

Marlene Nelson (ME '74) knows firsthand the value of a quality engineering education. She is now the Chief Project Engineer at Boeing on the 747 jumbo jet. "CAMP does what Boeing looks for in higher education engineering schools," Nelson said. "It provides the working-together team environment that allows students to gain valuable experience that better qualifies them for future job opportunities in the industry."

Nelson, who was not part of the Boeing award committee, was nonetheless able to provide some insight why Boeing selected SDSM&T over some very impressive competition to win the 2000 Outstanding Educator Award. "The judges were particularly impressed with the multi-faceted, complex projects involving large teams of engineers from different curricula, and the assignment of responsibilities - including sub-system design, project schedules and budgets," she said. "The Engineering Department and its faculty structured the teams and focused on all the elements of developing a product: the complete product life cycle process, including requirements, design, manufacturing, and service aspects, as well as cost and schedule issues. This is just the way it happens in the real world," she said.

Each year the winner of the Outstanding Educator Award is selected based on improvements to undergraduate education in engineering. The award is biased toward submittals that offer long-term approaches, and recognize work that has had a demonstrable impact. By recognizing one institution annually, Boeing hopes to further encourage improvement in the education process.

The Center of Excellence for Advanced Manufacturing and Production prepares students for the realities of

today's competitive workplace. CAMP utilizes the skills of Tech students who conduct interdisciplinary research and form enterprise teams. Oftentimes, these teams help private companies solve design and manufacturing challenges. At other times, as in the case of the Mini-Indy, Mini-Baja,



Pictured above is a sample of the different South Dakota School of Mines & Technology projects (top left), Mini-Baja (top right), Solar Motion Team (bottom left), Mini-

Concrete Canoe, Solar Motion Team, Institute of Electrical and Electronic Engineers (IEEE) Robotics Competition, and Human Powered Vehicle, the teams compete nationally with other tech-heavy colleges.

The vision of CAMP is to integrate students, faculty, and industry partners into a Center that provides a unique approach to engineering education. Its goals are 1) to develop an innovative educational program based on the concept of enterprise teams, 2) to create an electronic community to facilitate interaction between



Receives Outstanding Educator Award

higher education and industry, and 3) to provide a focus to manufacturing technology assistance.

"The answer in the back of the book doesn't exist! CAMP is an exciting workshop for real-life engineering where there are no hard and concrete answers,"



Photos by Kari Larese

South Dakota School of Mines and Technology vehicle teams. Human Powered Vehicle Team (bottom right), and Concrete Canoe (center).

said Will Kroll (ME, Corbett, OR), CAMP student and Mechanical Engineering Team Leader, Solar Car Team. "The 100% hands-on, practical projects that CAMP oversees are where many students like myself connect the theoretical with the practical and have a lot of fun at the same time."

The goals of the CAMP program align closely with the desired attributes Boeing has identified for engineers within their company. The hands-on, practical experience students gain through the program better equips them for careers as

an engineer, and match the qualities industry leaders are seeking as employees.

Desired attributes of an engineer identified by Boeing that match-up with CAMP's development include:

- A good understanding of engineering science fundamentals
- A good understanding of design and manufacturing processes
- A multi-disciplinary, systems perspective
- A basic understanding of the context in which engineering is practiced
- Good communication skills
- High ethical standards
- An ability to think both critically and creatively – independently and cooperatively
- Flexibility, the ability and self-confidence to adapt to rapid or major change
- Curiosity and a desire to learn for life, and
- A profound understanding of the importance of teamwork

Engineering students at Tech are learning these qualities in each class they take, each day they prepare for a competition, and each industry project they work on. From engineering fundamentals, to communication skills, to self-drive and initiative, CAMP students are assimilating the industry-demanded skills necessary to succeed.

The effect of CAMP is pervasive through courses, curricula, faculty, and students in all campus departments. More than 200 graduate and undergraduate students are directly affected by the program, and approximately 400 students, freshmen through seniors, are indirectly affected. Over the four years that engineering students spend on the Tech campus, most of them are touched by CAMP in some way either directly in a project or in a course or lab supported by the program.

Outside the university, CAMP also has an effect. It is connected with the Center

for Manufacturing Technology at South Dakota State University, Western Dakota Technical Institute in Rapid City, and with regional industry and governmental agencies through student CAMP projects solving specific problems, developing products, or helping startup companies. In addition, the student teams have made dozens of visits to K-12 classrooms, museums, and provided exhibits at the mall, communicating the excitement of engineering.

"CAMP stands up to the competition and prepares graduates of the South Dakota School of Mines & Technology to be leaders in industry," said Dr. Richard Gowen, President of the South Dakota School of Mines & Technology. "It is a momentous occasion that we can celebrate the university's selection as the Boeing Outstanding Educator Award. We need to seize this unique opportunity and utilize this financial endowment to move the CAMP program to the next level."

CAMP will receive a single award of \$50,000. Batchelder, Dolan, and Iyer are considering using the total amount of the award money to purchase a modern manufacturing system called a rapid prototyping machine. The award would comprise half of the money needed to purchase the \$100,000 machine. "Rapid prototyping would take CAMP to the next level of excellence in engineering," said Dolan.

The 2000 Boeing Outstanding Educator Award has truly recognized a university that strives each day to provide the best engineering education possible for its students. The award is an honor for the South Dakota School of Mines & Technology, and, in particular, for Professors Dr. Dan Dolan, Dr. Mike Batchelder, and Dr. Srinivasa Iyer, developers of the CAMP program.





Hardrocker Racing Technology

Engine roars so loud you can't talk, but you don't want to. You're focused 100% on your car, ensuring it performs better than it can. Yet, that extra 15% of you is eavesdropping, watching, and learning.

It is the Formula SAE (Society of Automotive Engineers) Competition in Pontiac, Michigan, where more than 107 schools from as far away as Japan and the United Kingdom have come to compete and learn in a truly unique environment. A year's worth of dedication, commitment, ingenuity, and determination culminate at the three-day competition.

Each team sets up shop in the parking lot of the Pontiac Silverdome where the weekend's racing action is to take place. As you unload your trailer, you scope out the competition hoping your car can stand up against the powerhouse teams of the University of Texas at Arlington, Rochester Institute of Technology, and Cornell University. Who is going to be this year's victor? Who's car can stand the rigors of the endurance run? The story unfolds in three days.

The Formula SAE Mini Indy competition is for student members of SAE to conceive, design, fabricate, and compete with small formula style race cars. For competition purposes the teams are to assume they are building a prototype car for evaluation as a production item. Their intended market is the weekend autocross enthusiast; thus they must design a high-performance car in terms of acceleration, braking, and handling.

Each vehicle is judged in a series of static and dynamic events to determine how well the cars perform. These include static inspection and engineering design, sales presentation, cost evaluation, solo performance trials including autocross and acceleration, and high

performance track endurance. Only one team can come away with the first place trophy, yet all competitors are winners. By competing among more than 100 other schools, everyone involved is helping each other learn more and experience more in a hands-on engineering competition.

"The competition is more demonstration and satisfaction of what the students have learned," said Dr. Dan Dolan, Mini Indy faculty advisor and Professor, Department of Mechanical Engineering. "It is so different than what they get out of the classroom. The students are learning and working at school, and this competition is the test. The only ones that fail are those that don't make it here."

The 1999-2000 academic year came to a close the weekend of May 17-21 for the Hardrocker Racing Team at SD Tech. Their mettle was tested as they had to wait patiently for rain and thunderstorms to pass through, waiting for their chance to show off their car and their mastery of automotive engineering.

Chenoa Jensen (MS ME, Piedmont) was commissioned by her teammates to kick off the competition at the sales and marketing presentation. Her task was to convince a group of three judges to buy their car, build it, sell it, and market it to consumers, and she did a terrific job. By

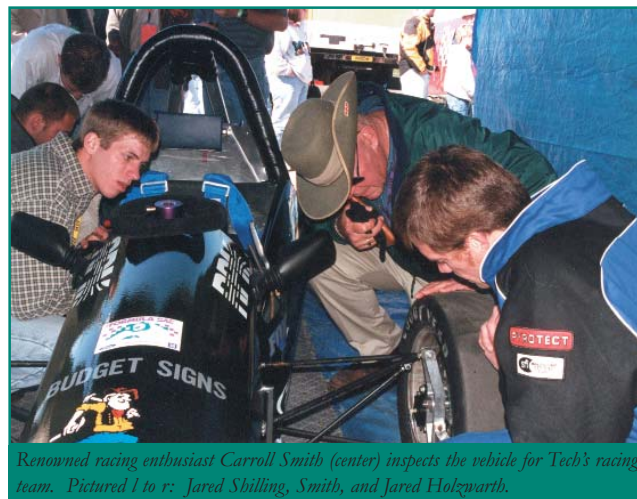
selling the SDSM&T Mini Indy as the 8th wonder of the world, Jensen had Tech off to a good start. They placed nineteenth in the presentation category.

While Jensen was impressing the judges, team leader and chief engineer Ben Short (ME '00) was taking the vehicle through Tech Inspection. This is when representatives from the big three, Daimler Chrysler, General Motors, and Ford, scrutinize each vehicle to ensure safety, and Formula SAE rule compliance. Cars are not judged during Tech Inspection, but if they do not pass, they cannot compete. Everything from bolts, suspension, to seat belt straps are evaluated. Tech passed with no problems.

The afternoon of day-one competition saw the Tech team compete in design and cost, and pass both the braking and tilt table tests. During the design competition team members must defend their design decisions, and the charge of the cost competition was to provide the best accurate estimate of the manufacturing cost of the car in limited production. The cars were not judged in braking and tilt table tests, but needed to pass in order to continue to compete.

Day-two was a battle against Mother Nature as both acceleration and skid-pad events were postponed, but Autocross was on for the afternoon. It was to be the first

dynamic event of the competition, and was much anticipated. Dynamic events test how well the cars are set up for high performance, and test the capabilities of the drivers. Autocross in particular tests the cars handling capability. The SD Tech vehicle was in the hands of an experienced driver, Ben Short. This was Ben's fifth year participating in the Mini Indy competition, and was his fifth year of driving experience. He proved a worthy opponent for the pool of 107 teams, as SD Tech finished in twenty-second place with a time of 71.502 seconds.



Renowned racing enthusiast Carroll Smith (center) inspects the vehicle for Tech's racing team. Pictured l to r: Jared Shilling, Smith, and Jared Holzwarth.

cing Team Puts to the Test



With the first major performance test behind them, a mountain lay ahead, the endurance run. Each vehicle must complete 24 laps on the autocross course. After 12 laps each team is given a three minute stop time to switch drivers. The endurance is the true test and is worth more than one-third of the overall point total.

"These cars are built for weekend high performance, not for endurance, so this is a real battle for most of the teams," said Dolan. "Everyone is pushing the limit on the design of their cars each year, and by pushing the limit on just one component can be a vehicles downfall."

SD Tech was not able to climb that final mountain. Jared Holzworth (ME '00) piloted the car the first 12 laps putting up some competitive times, yet the car was not going to last. During their three-minute break, the judges pulled there car from the race due to a fluid leak. Only 23 of the 107 participating teams finished the endurance run.

The SD Tech team placed 41st overall. They finished 19th in sales and marketing presentation, 58th in cost, 22nd in autocross, and 32nd in acceleration. Their placement in presentation, autocross, and acceleration is the best showing SDSM&T has had in those categories since they began competing in 1996. "Overall we did pretty well for our resources," said Dr. Dan Dolan. "We had a marvelous car and made a giant step forward."

The Formula SAE competition gives students the means to take their theoretical

knowledge and turn it into practical experience. In addition to the hands-on work of building and racing a formula style race car, students learn to meet deadlines, work as a team, and learn how to handle unexpected problems.

is exciting."

The experience every student on the 107 participating teams gains from the competition is invaluable. Through the scrutinizing of their own vehicle to the many lessons learned while admiring other

cars, they are coming away as more knowledgeable engineers and more of a commodity to industry recruiters. As racing guru Carroll Smith commented, "It is vitally important to get the practical experience the Formula SAE competition offers. The top companies are looking for engineers who have actually built something and worked as part of a team. You don't get that in school."

This year's Mini-Indy team members who traveled to Pontiac are: **Ben Short** (ME, Sturgis), **Edvin Kvalvik** (ME, Norway), **Travis**

Photos by Kari Larese



Mini-Indy team consults with driver Jared Holzworth after a test run. Pictured l to r: Eric Swanson, Austin Falkingham, Jared Shilling, Holzworth, Edvin Kvalvik, Travis Ernst, and Seth Elkins.

Unique to the SD Tech Mini Indy this year was the more involved partnership between SDSM&T and Western Dakota Technical Institute (WDTI). Four students from WDTI, Jared Shilling, Cory Anderson, Trampass Larson, and Kurt Hartman, became members of the Hardrock Racing Team and assisted tremendously in the area of manufacturing.

"By coming to Pontiac we get to meet a lot of good people, see work in action, and have a good time," said Shilling. "We learn a lot more from the hands-on work and the competition, than from sitting in a classroom. We learn from our mistakes and figure out how to do it right next year."

"We get everything from this," said Marcus Leggate (ME '00). "There is a lot of excitement in seeing the vehicle work. We saw the process from the ground up, and now to see it work and be competitive

Ernst (ME, Rapid City), **Seth Elkins** (ME, Taylor, ND), **Marcus Leggate** (ME, Dickinson, ND), **Eric Swanson** (MET, Gillette, WY), **Jason Hornecker** (MS ME, Lander, WY), **Jared Holzwarth** (ME, Panama), **Chenoa Jensen** (MS ME, Piedmont), **Jake Anderson** (ME, Buffalo, WY), **Roy Reiss** (ME, Java), **Adam McMahon** (ME, Pierre), **Forrest Foster** (ME, Oral), **Todd Jacobs** (ME, Rapid City), **Amber Schmidt** (ENGR, Aberdeen), **Ben Rhode** (ME, Yankton), **Austin Falkingham** (ME '00), and Jared Shilling from Western Dakota Technical Institute. **Dr. Dan Dolan**, Professor, Department of Mechanical Engineering, was the faculty advisor.



Distinguished Faculty Leaves Concrete Legacy



A simple journey from your house in the morning to your place of work introduces you to the many uses and advances of concrete. You pull away from your house off of your concrete driveway, onto the concrete roadway on your route to work. You inevitably pass numerous concrete light posts, concrete stoplight posts, drive over concrete bridges, and pass concrete benches at bus stops sitting in front of concrete buildings.

Concrete has been used in construction for more than 2,000 years, perhaps beginning with the Romans as they built roadways and aqueducts. Today we see concrete utilized in more ways than we can count. We are now witnessing the use of concrete in the construction of the world's largest building in Chicago, Illinois. It is no wonder that Dr. Venkataswamy Ramakrishnan (Dr. Rama), Distinguished Professor, Department of Civil and Environmental Engineering, has devoted his life's work to researching and understanding concrete and concrete structures.

"The knowledge times over th

"Concrete interests me because it is the most complex of all materials available," said Dr. Rama. "I began studying concrete more than 30 years ago because it is such a challenging material. Despite the large number of developments over the past 10 years, what we know is so little compared to what we do not know about concrete."

Dr. Rama completed his undergraduate studies and received his postgraduate diploma at the University of Madras, India with an emphasis in civil engineering, and social sciences. He received two Diplomas of Imperial College (equivalent to a master's degree) from the University of London with emphases in hydropower engineering, and concrete technology, and earned his Ph.D. in civil engineering from the University of London in 1960.

He began his professional career as a Junior Engineer in the Madras Public Works Department in 1952 and shortly thereafter began lecturing in civil engineering at PSG College of Technology where he advanced from an Assistant Lecturer to Professor and

Head, Department of Civil Engineering in 1961 until 1969. It was the later part of 1969 when Dr. Rama came to the South Dakota School of Mines & Technology as a Visiting Professor in Civil Engineering and he has never left.

Dr. Rama is an international expert in the field of concrete and concrete structures. He has received numerous awards, and honors, and has published more than 200 research papers and technical articles; presented at more than 200 international conferences; and submitted more than 300 technical reports on completed research projects.

Most recently Dr. Rama was the recipient of two prestigious awards, The Robert E. Philleo Award and an appointment as Emeritus Member of the Transportation Research Board (TRB) standing committee on Properties of Concrete.

The Robert E. Philleo Award is the only award given for research excellence

“Dr. Ramakrishnan is equally remarkable in his devotion to education. Our undergraduate and graduate students have benefitted tremendously from his knowledge and experience in structural engineering and high performance concrete. He is well respected by our students, staff, and faculty,” said Bang.

Within the field of concrete, Dr. Rama’s main research interests lie with fiber reinforced concrete, concrete fiber composites, and high performance concrete. Recently he has been involved in research with the South Dakota Department of Transportation Highway Administration in which he developed high performance concrete with 16,500-psi (pounds per square inch) strength. A bridge prestressed concrete girder was built utilizing this concrete in Sioux Falls last summer marking the first time in the United States such a high strength concrete was used in bridge construction. Traditionally bridges are built using 6,000-

used in the construction of bridges. Dr. Rama was charged by the Transportation Research Board to write a book on this subject that was published in 1980.

Additionally, for more than 30 years Dr. Rama has worked as an international consultant for such major industries in the United States as 3M Company, Mobil Research and Development Corporation, Forta Corporation, Dupont, U.S. Steel, and Allied Signal. He has done consulting for PPG – the second largest glass producer in the world – in which he is developing some glass fiber reinforced concrete, and he has also been working with 3M for the past five years developing new high-tech, synthetic fiber for addition in concrete.

“The knowledge about concrete has multiplied at least five times over the past ten years,” said Dr. Rama. “There is more knowledge being discovered each year because concrete is the most largely used construction material in the world.

about concrete has multiplied at least five the past ten years.” --Dr. V. Ramakrishnan

by the American Concrete Institute. It recognizes individuals for their contributions in the field of concrete and awards excellence in overall achievement. Dr. Rama was the ninth individual to ever receive the award.

Dr. Rama was only the second individual to receive an appointment as an Emeritus Member of a TRB standing committee in the concrete section. The Emeritus Membership was established by TRB two years ago as a means of recognizing the significant and long-term contributions of individuals who have provided outstanding service.

“Dr. Ramakrishnan is an internationally recognized expert on high performance concrete,” said Dr. Sangchul Bang, Dean, College of Earth Systems. “His research works have helped expand the use of high performance concrete in various civil engineering structures. His reputation spans from theory to practice and is recognized by national and international experts.

psi concrete. This summer the DOT plans to build a second bridge with this high strength concrete.

Since he has been at SDSM&T Dr. Rama has also completed research on shear wall structures, plastic analysis of buildings, and latex modified concrete. Shear wall is a type of structural building that has been utilized but lacks design information. Dr. Rama’s research contributed to the knowledge and method of design for this type of construction.

Plastic analysis of buildings is a new method of analysis that would replace the current elastic analysis method currently in use. Elastic analysis refers to the method that a building frame is analyzed to determine the force of the loads coming onto the frame. A new plastic analysis method would utilize the plastic behavior of concrete to make the same measurements.

Latex modified concrete is impermeable concrete that is typically

It is an essential part of any construction. Without concrete there is no construction,” he added.

From building a bridge, building, or sidewalk, concrete expands all facets of civilization. It is the most durable building material available and the pool of knowledge individuals draw out of about the subject is a droplet of water compared to the oceans that exist.

Dr. Rama has dedicated more than 40 years of his life and his career to expanding the knowledge and use of concrete, and he has only opened the door so slightly. Yet compared to previous and existing information, Dr. Rama has climbed mountains. As bridges are built, streets are paved, and light posts are erected today and for years to come, you can be sure that Dr. Rama is looking for a better, more durable concrete mixture to last us hundreds of years.





Photo by Julie Smoragiewicz

An area family visits the Pig Dig, a Museum of Geology Field Dig site, located at Badlands National Park.



Photo by Kari Larese

Bert Cantu (MET, Rapid City) receives congratulations from Dr. Gowen for his participation in the 2000 Senior Design Fair.

SDSM&T REACHING OUT

The South Dakota School of Mines and Technology has a firm belief in partnering their faculty, staff, and students with communities, businesses, and K-12 educational organizations throughout the region.

Photo by Kari Larese



The Department of Humanities hosted a three-part series on communications issues funded by the Dow Chemical Corporation. The second series featured (pictured above l to r) Dale Bryson (CE '60), Gary Veurink (ChemE '72), Doug Aldrich (BS ChemE '62, MS ChemE '68), and Keith Zell (ME '65).



Above is one of the many groups that explored the NASA MAEL (Mobile Aeronautics Education Laboratory) Unit featured at the Children's Science Center. The MAEL Unit is a resource center that travels around the country educating students in engineering, mathematics, science, and aeronautics.

Photo by Kari Larese



Photo by Kari Lares



Photo by Tiffany Smith

SDSM&T hosted week long AP Institutes in Math and English Vertical Teams and Environmental Science. Pictured is Dr. Karen Whitehead, Vice President for Academic Affairs, addressing the participants.



Photo by Lisa Duncan

Hanna Parent experiments with bubbles during the Children's Science Center's second annual Bubble Festival.



Jesse Hinkson and Becky Johnson of West Middle School display their science project "Melting Chocolate" at the High Plains Regional Science Fair on the Tech campus.

Endowed Chair by Sawtek

When Steve Miller (EE '69) arrived at the South Dakota School of Mines & Technology (SDSM&T) in 1965, no one could imagine the journey that lay ahead. Driven by his propensity to excel, his solid education, and his technological insight, he has led an incredible life and achieved great career success. Thirty-five years later, Steve has returned to SDSM&T to give back to his alma mater by establishing SDSM&T's first-ever endowed chair, The Steven P. Miller Endowed Chair in Electrical Engineering, with a gift of more than \$1.2 million. Here is the inspiring life-story of an entrepreneur living the "American Dream."

Steven P. Miller grew up in Beresford and graduated from high school in 1965. Four years later, he earned his electrical engineering degree and graduated with honors from SD Tech. Throughout his college years, Steve was active in both academic and student activities. He was a member of Eta Kappa Nu, Institute of

Electrical and Electronic Engineers (IEEE), the Singing Engineers, and Delta Sigma Phi fraternity. He also participated in varsity golf and intramural football. During his senior year, Steve was the business manager for the "Three of Us" folk singing group and coordinated a concert tour of South Dakota high schools to promote the university.

After graduation, Steve married Kathleen L. Casey of Madison, South Dakota, and was employed by Texas Instruments. During his nine-year tenure, he held various engineering positions, and in 1973, he became the Manager of the Surface Acoustic Wave (SAW) Device Engineering and Development Laboratory. At that time, rudimentary SAW technology was being used in both military and commercial applications. Today, it has evolved to expand the boundaries of the wireless neighborhood by reducing noise and interference for wireless systems, and increasing speed and precision of voice and

data communication. SAW technology plays an important role in every day use of cellular phones, cable TV, wireless Internet access, satellite communications, and military and medical applications.

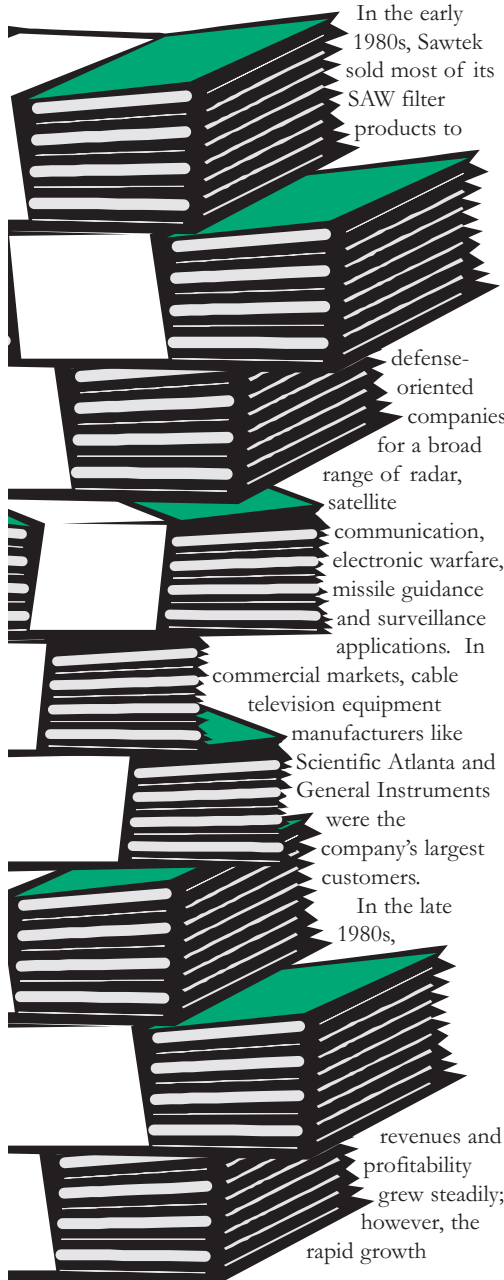
When Texas Instruments decided not to pursue commercial SAW device business opportunities, Steve and three of his co-workers seized this window of opportunity; they wrote a business plan to raise venture capital financing for a new company to be formed in Texas. After almost two years, Steve and a reconstituted management team succeeded in raising enough capital from a private company located in Orlando, Florida, to start Sawtek. The company was formed in 1978, and Steve and his three co-founders moved to Florida to begin operations.

Photo courtesy of SDSM&T Foundation



Steve Miller, Rod Pappel, and Dr. Larry Simonson put the finishing touches on the establishment of the Endowed Chair position.

Chair Milled k Founder



In the early 1980s, Sawtek sold most of its SAW filter products to

defense-oriented companies for a broad range of radar, satellite communication, electronic warfare, missile guidance and surveillance applications. In commercial markets, cable television equipment manufacturers like Scientific Atlanta and General Instruments were the company's largest customers.

In the late 1980s,

revenues and profitability grew steadily; however, the rapid growth

envisioned by the company's professional investors had not yet occurred, and they became impatient. In January 1991, Steve and one of the remaining founders formed an Employee Stock Ownership Plan (ESOP) and purchased back all of the stock held by the venture capitalists. The common stock ownership of the company changed significantly as a result of the ESOP becoming the majority shareholder. The decision to couple the employees into the success of Sawtek through an ESOP turned out to be one of the most significant events in the company's history.

During this same time frame, the market for SAW components began to explode. With the advent of cellular phone technology, the "Wireless Revolution" was close at hand, and dozens of companies around the world were attempting to establish early leadership positions in the market. Because of its unique product, Sawtek experienced rapid growth in the early 90's and became a leading provider of SAW filters. In 1996 Sawtek completed an Initial Public Offering on the NASDAQ exchange with the ticker symbol of "SAWS."

In fiscal year 1999, Sawtek employed approximately 600 employees, achieved revenues of \$100 million, and net income of 31% of sales with international sales equaling 41% of the total sales. Most of the 350 employees that work for Sawtek in Orlando have been with the company since before the ESOP was established in 1991. Because the ESOP allows every employee to participate in the ownership of the company, shareholder interests were easily

Photo courtesy of Steve Miller



Steve Miller

aligned. As a result of their hard work and the emergence of the "Wireless Revolution," employees personally experienced the phenomenal growth of the company. Consequently, more than 200 "millionaire" employee shareholders go to work at Sawtek each day.

Steve Miller served as President of Sawtek since its formation in 1978, Chief Executive Officer since 1986, and Chairman of the Board since 1996. In September 1999, Steve retired, but remains as Chairman. He has turned his focus to a variety of personal interests including his wife, three children and two grandchildren.

Larry Simonson (EE'69), Department Chair of Electrical Engineering and close personal friend of Steve and Kathy Miller, is very excited about the opportunities that this gift will make available to the department. He stated, "An endowed chair will allow the department to develop a focus in the area of telecommunications that will benefit our students, our faculty, and our profession and will bring honor to the university." Simonson added, "I expect that this gift will also bring entrepreneurial opportunities for students who wish to contribute to the economic development of the area."

By establishing the Steven P. Miller Endowed Chair in Electrical Engineering, Steve hopes that "future generations attending SDSM&T can benefit from a unique educational experience through exposure to a distinguished university faculty member."



Industrial Engineering Students Improve Workplace Environments

Black Hills Workshop • Rapid City Regional Hospital • Merrillat Industries • South Dakota Army National Guard •

At no cost to you, a trained engineering team will come into your workplace, target a specific operation or project, and through a formal presentation, make recommendations on how to operate more efficiently and safely. FREE!

How does this sound to you? Like a pretty good deal? Of course it is!

Industrial engineering students at the South Dakota School of Mines & Technology are doing just that. Dr. Carter Kerk, Assistant Professor, Industrial Engineering Program, leads two courses each year in which students spend the final third of the semester out in the field gaining hands-on, real-life engineering experience. IENG 311 - Work Methods and Measurement, and IENG 321 - Human Factors Engineering, are two required courses for industrial engineering students at SD Tech.

"This is a big winner for the students," said Kerk. "It gives students a chance to do a real world project, see what some of the constraints are out there in terms of time, space, money, and so forth. They (students) get to tackle a real project, struggle with it, and usually it all comes together in the end very nicely."

"By working at a real life business, the class itself becomes real, not just a textbook with some tests," said Amy Wilson (IENG, Hamilton, MT). "Doing projects teaches us how to go about solving problems, working on a team, and other basic skills we will need to learn and refine when we enter the workforce."

As part of the courses the students must prepare a written report and give an oral presentation to the industry representatives. These requirements allow the students to practice their verbal and written communication skills, both of which are very important as an industrial engineer, Kerk notes. "We pride ourselves on communication, and an industrial engineer needs to communicate well on all levels, understand workers, talk to workers and managers, deal with each other, and work in many different environments."

In each course, a group of three to five students is matched up with a local industry or organization that has volunteered to sponsor a project. For no cost, the students come into the workplace, look over a specific operation or

project, and make recommendations as to how it can run safer and more productively.

A sample of the projects the students have taken on over the past three years include *Dishwashing Wheelchair Accommodation* at Black Hills Workshop; *Inpatient Pharmacy* at Rapid City Regional Hospital; *Notching Workstation Evaluation* at Merrillat Industries; *United States Purchasing & Finance Office Ergonomics Evaluation* at South Dakota Army National Guard; and *Unpacking Operations* at Land O'Lakes. Other industries that have benefited from the industrial engineering students include Cleghorn Springs Fish Hatchery, Dacotah Cement, Northern Hills Workshop, United Blood Services, Rapid Controls, SCI, SDSM&T, and Trisha Waldron Jewelry.

During the spring 2000 semester, a group of four IENG students dedicated their time to a project with the Black Hills Workshop (BHW). The company provides contract labor and fulfillment solutions for companies with outsourcing needs, as well as vocational training for individuals with special needs. Black Hills Workshop has a contract with Ellsworth Air Force Base (EAFB) to run the switchboard. The base has given the workers a small, congested room to work in, and staff 24-hours a day, 7 days a week, 365 days a year. Many of the individuals who work at the switchboard are confined to wheelchairs, and have various disabilities that needed to be accommodated.

Pam Ekberg, Pat Valdez, and Michelle Hopperdietzel of BHW sponsored the students to come to EAFB, evaluate the workspace, and make suggestions that could make

the room operate more efficiently. When identifying solutions, the students tried to envision common sense, no-cost solutions first, low-cost solutions second, and higher-cost solutions third. Next, they justify the expenditure in a cost analysis.

"This was the seventh project the Tech students have helped us with," said Ekberg. "They are good for us."

"It is very good to have an engineer's perspective on these different projects. We know it takes teamwork to make this work, and together we can do more. As an occupational therapist I know the special needs of the individuals that need to be addressed and

continued on page 21



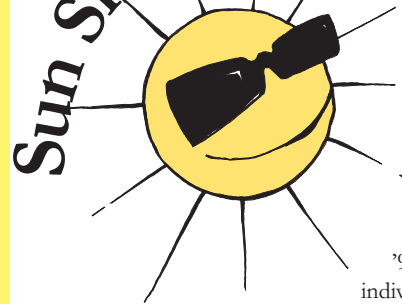
Photo by Kari Larese

L to R: Kyle Garstang (IENG, Rolla, MO), Amy Wilson (IENG, Hamilton, MT), Thomas Nelson (IENG, Irene), and Terra Stroup (IENG, Fort Pierre), just completed their presentation and recommendations to the Black Hills Workshop Staff.

Land O'Lakes • Cleghorn Springs Fish Hatchery • Dacotah Cement • SCI •

Northern Hills Workshop • United Blood Services • Rapid Controls • SDSM&T • Trisha Waldron Jewelry

Sun Shines on Tech Alum



In February Sun Microsystems bestowed the Chairman's Award for Innovation upon Michael Boucher (MS CSC '91) and 14 other individuals employed by Sun. The award is one of the highest levels of recognition at Sun and rewards individuals whose accomplishments are integral to the company's success or strategy execution.

Boucher is a Senior Staff Engineer and is Sun's Solaris Tools Performance Architect. His area of concentration is in enabling high performance computing through the development of cutting edge runtime software and tuning tools.

Boucher and his team (eight members of which are SDSM&T graduates) have been instrumental in making improvements to software and significantly advanced Sun's position in the high-performance computing market. Upon his receipt of the award, Mike was praised for his expertise and leadership in high performance computing forums, and for software his team designed that allows high-end Starfire systems to operate at peak efficiency.

In addition to his expertise in the area of high performance computing, Boucher contributed to work in an emerging numerical technology called interval arithmetic, nurtured positive interactions with customers, and was involved in various cross-divisional meetings and reviews for software and hardware. He contributed to the design for new tools that help simplify both the effort to write software that efficiently takes advantage of large processor machines as well as tune and scale that software across a variety of machines. His current research interests are in new techniques in programming parallel computers and achieving high performance from large computer programs.

Boucher has been employed by Sun Microsystems since 1998, one year after Sun first approached Mike and his wife Diane (MS CSC '91) about the possibility of acquiring Dakota Scientific Software, a Rapid City company they co-founded in 1990 to apply supercomputer technology in the workstation market. In 1994 Dakota Scientific began supplying technology to Sun, and over the next three to four years the relationship between the two companies continued to expand.

Mike and Diane came to Rapid City from St. Paul, Minnesota where Mike had been working for a supercomputer company called ETA Systems. The couple came to the School of Mines to fill-in for Dr. Ed Corwin, Professor, Department of Mathematics and Computer Science, and his wife Dr. Toni Logar, Professor, Department of Mathematics and Computer Science, while they were on sabbatical for a year. When the

sabbatical was extended, Mike and Diane stayed for a second year and later decided to remain in Rapid City teaching at the university.

"In December 1990, with significant financial, technical, and business help from SDSM&T through the Technical Assistance Program (TAP), we started Dakota Scientific Software," said Boucher. "Through the assistance of TAP, and low-interest loans from Rapid City's Rapid Fund, we were able to grow to 12 employees within a few years.

"Rapid City is an excellent place to start a business. The TAP program gives access to a variety of strong expertise from SDSM&T. Both Rapid City and the state of South Dakota are available to give financial and non-financial assistance. The ability to offer former SDSM&T students rewarding work in Rapid City gives a powerful recruiting tool for new businesses," said Boucher.

Despite having been drawn away from Rapid City by Sun Microsystems, Boucher remains actively involved in programs and activities at the South Dakota School of Mines & Technology. He is a member of the Industrial Advisory Council for the Department of Mathematics and Computer Science, and is the technical lead on the Sun side for a collaborative research program between Sun and SDSM&T. "This is the largest collaborative research program that Sun has funded in the last five years and it has been very successful for both parties," said Boucher.

In November 1999 Sun and SDSM&T entered into the collaborative research program to investigate new areas in high performance computing. As part of the project SDSM&T opened a new computer lab, made possible by Sun through a donation of computer equipment and research funding together valued at more than \$400,000. The hope by the core group of Tech faculty and students from the Department of Mathematics and Computer Science working with the new lab is that each department on campus will take advantage of the considerable computing power Sun has provided to the campus. For example, the atmospheric scientists can run weather models on the equipment which usually are run off-site, saving them time and gaining flexibility in their research.

Sun Microsystem's Chairman's Award for Innovation was instituted with a goal to recognize individuals whose accomplishments are instrumental in the success of Sun's success or strategy execution. Success begets success, hence it was only fitting that Sun recognized Michael Boucher as a recipient of the award in February 2000.



A Sun Microsystems representative presents Mike Boucher with the award.

Photo courtesy of Mike and Diane Boucher



Then & Now

ALL SCHOOL REUNIONS

The first official all school reunion was held in 1950. Alumni were invited back to the Tech campus to enjoy a variety of planned activities, tour the campus, and visit with old friends. The Dud King Golf Classic and M-Hill Climb have become traditional activities at the reunion held every five years. Pictured are 1950 tunnel activities and a 1995 pancake breakfast.

Photo courtesy of SDSM&T Alumni



File photo



"GRUBBY"

In 1969 on the 50th anniversary of the Drill and Crucible Club, a plaque of the Grubby Mascot was presented to the school. Today, Grubby signifies academic excellence, school spirit, and athletic prowess.

Photo courtesy of SDSM&T Alumni



The 28 year period spanning from 1944 to 1972 saw the dawning of a new era as technology took a foothold on campus; Grubby became a symbol for Tech's heritage; Surbeck Center became a focal point of student activity; and alumni reunions became a tradition. Fifty years later we remember the history and acknowledge the present state of the university.

STUDENT UNION

The Surbeck Center was constructed in 1961, supported through funds largely from alumni and friends of the university.

Students forty years ago and today still enjoy the pool hall.

Photo courtesy of SDSM&T Alumni



COMPUTERS

An IBM 1620 was the first computer purchased by SDSM&T in 1961. Today 151 computers are available on campus for undergraduate student use, 100 of which offer Internet access. Pictured is George Gladfelter, Director of Student Information Systems, working on the IBM 1620 and Chris Hofer (CENG, Freeman) shows off new Gateway computers.

File photo



Photo courtesy of SDSM&T Archives



File photo



CAMPUS BRIEFINGS

The annual Career Service Banquet was held on April 18. The following were honored for their service at SDSM&T: **Steven J. Bauer**, Instructional Technology Services, 5; **Rita T. Sabe**, Industrial Engineering, CAMP, 5; **Sandra D. Meier**, Business and Administration, 5; **Lisa M. DeVries**, Human Resources, 5; **Ruth M. Fontenot-Prince**, Museum of Geology, and Alumni Association, 5; **Sheila J. Lien**, Graduate Education and Sponsored Programs, 10; **Charles F. Schilling**, Department of Mechanical Engineering, 10; **Keith O. Pruitt**, Department of Electrical and Computer Engineering, 15; **Bonnie L. Cecil**, Surbeck Student Center, 20; **Diane G. Fraser**, Bookstore, 20; and **Irene L. Vanderbush**, Office of Academic and Enrollment Services, 20. **Recipients of the Traditions of Excellence Award were also recognized:** **Wendy Boomer**, Business and Administration, and **Nan G. Halvorson**, Business and Administration, April 1999; **James R. Hartman**, Educational and Technology Services, May 1999; **Debra K. Rowse**, Business and Administration, June 1999; **Barbara A. Ogaard**, University Scheduling Center, July 1999; **John C. Lofberg**, Office of the Vice President for Academic Affairs, August 1999; **Neal H. Hodges II**, Instructional Technology Services, September 1999; **Yvonne M. Paulson**, Little Miner's Clubhouse, October 1999; **Karen D. Henriksen**, Bookstore, November 1999; **Debra A. Ziedler**, Department of Social Sciences, December 1999; **Helen J. Birkholz**, Graduate Education and Sponsored Programs, January 2000; **Ruth M. Fontenot-Prince**, Museum of Geology, Alumni Association, February 2000; and **Kathleen F. Fischbach**, Department of Civil and Environmental Engineering, March 2000.



Dr. Daniel Heglund, Associate Professor, Department of Chemistry and Chemical Engineering, presented a paper entitled "Preparation And Evaluation Of A New Cation Exchange Material Utilizing Sulfonated Pine Cones," at The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy. The conference was held in New Orleans. The paper was co-

authored by Heglund, **Melissa R. Reis** (MS MES, Hamill), **Todd D. Nye** (CHEM '99), and **Michael A. Brinster** (CHEM '99).

Dr. Susan L. Reid, Director of Choral Activities, was invited to present at North Central American Choral Directors Association Convention March 2-5. Her topic was "Baroque and Classical performance practice in G.F. Handels' "Messiah." The convention was held in Madison, WI.

The Department of Humanities hosted the second of a three-part series on communications issues funded by the Dow Chemical Corporation on Thursday, April 13, 2000. **Gary Veurink** (ChemE '72) of Dow Chemical, **Dale Bryson** (CE '60) of EPA, **Doug Aldrich** (BS ChemE '62, MS ChemE '68) of Dow Corning, and **Keith Zell** (ME '65) of MTS Systems, discussed the challenges they've already encountered in their respective industries and how they anticipate meeting the challenges ahead.

Dr. Michael Langerman attended an EC2000 ABET Regional Faculty Workshop March 25-26 in Phoenix, Arizona. The workshop was sponsored by Motorola University West, Raytheon Systems Company, and Global Wireless Education consortium.

The Career Service April Tradition of Excellence award winner was **Dale Nickels**. Dale is employed as a Fabrication Technician and has been at Tech almost 17 years. Additionally, new representatives have been selected who will serve two-year terms on the Career Service Council. Division A (O'Harra): **Lisa DeVries**, Personnel Assistant, Human Resources; Division D (Little Miner's Clubhouse, SKILL, Tech Print Center): **Richard Beshara**, Press Operator, Tech Print Center.

Dr. Roger Johnson, Associate Professor, Department of Mathematics and Computer Science, presented the paper "Estimating NFL Point-Spreads" at the Rocky Mountain Section of the Mathematical Association of America's Section Meeting held at Colorado State University in Fort Collins, CO April 7-8.

Dr. V. Ramakrishnan, Distinguished Professor, Department of Civil and Environmental Engineering, has been appointed as the member of the Transportation Research Board Committee A2E05, Committee on Concrete Materials and Placement Techniques for a three year term up to January 2003. He has also been appointed as the oversees Advisor for the Editorial Advisory Board for the Indian Concrete Institute Publications. Two papers based on the research done at SDSM&T titled "Statistical Model and Prediction of Fatigue Life of High Performance Lightweight Concrete" was published in the journal, New Building Materials & Construction World, February 2000. The paper was Co-authored by Dr. Ramakrishnan and our former graduate student, Siva Kumar Chockalingam of Hibbit Karlson & Sorensen, Inc. U.S.A. A second paper titled "Structural Application of Polyolefin Fiber Reinforced Concrete" authored by Dr. Ramakrishnan was published in the American Concrete Institute Special Publication SP 182, "Structural Applications of Fiber Reinforced Concrete", Published by ACI International.

The SDSM&T Chapter of Tau Beta Pi congratulated the newest members that were initiated this spring. The newest faculty members are **Dr. Bruce Berdanier**, Assistant Professor, Department of Civil and Environmental Engineering, **Dr. James Cote**, Assistant Professor, Department of Electrical and computer Engineering, **Dr. Jon Keller**, Associate Professor, Department of Materials and Metallurgical Engineering, and **Dr. Carter Kerk**, Assistant Professor, Industrial Engineering Program.



At the 49th Annual Honors Convocation SDSM&T officials presented awards to students, faculty, and friends of the university in recognition of their outstanding service and academic achievements. **Bruce Rampelberg**, president of American State Bank in Rapid City, received the 2000 SDSM&T Outstanding Public Service Award; **Jim Ghents**, science teacher at Rapid City

IE Students Improve Workplace Environment

Stevens Senior High School, received an Award for Outstanding Teaching; The American Indian Science and Engineering Society (AISES) Outstanding Teacher Award was given to **Sandra Brandenburger**, instructor of English college preparatory classes, and Gifted Coordinator at Cheyenne-Eagle Butte High School in Eagle Butte; **Dr. Jan Puszynski**, Professor, Department of Chemistry and Chemical Engineering at SDSM&T, received the Presidential Award for Outstanding Professor; the Benard A. Ennenga Faculty Award was given to **Dr. Robin Lipke**, Assistant Professor, Department of Social Sciences; and **Dr. Sidney Goss**, Professor, Department of Social Sciences, received the Virginia Simpson Award

The SDSM&T141st commencement was held Saturday, May 13, 2000. **Charles Cox** (ME, Yankton) delivered the senior class message, and **Dr. Bill Hughes** (EE '49) of Rapid City delivered the commencement address. Special honored guests also included Executive Director, South Dakota Board of Regents **Dr. Tad Perry**, and the 2000 Guy E. March Medallist, **John Duff Erickson** (MINE '55).



Dr. Stephen Pratt, Chair and Associate Professor, Department of Social Sciences, **Dr. Charles Kliche**, Associate Professor, Mining Engineering Program, and **Dr. Andrey Petukhov**, Associate Professor, Department of Physics, are recipients of the 2000 Governor's Teaching With Technology Awards. Overall Governor Bill Janklow is providing \$1,260,880 to 59 faculty members at South Dakota's six state universities for computer-based projects this summer.

The Children's Science Center received a gift of \$100,000 from the Rapid City Journal for the renovation of the North Wing.

Our sympathy to the family of **Toni Hauff** for the loss of her oldest son Derek.

Our sympathy to the family of **Dr. Steven McDowell** for the loss of his mother.

Our sympathy to the family of **Dr. Carter Kerk** for the loss of his mother-in-law.

Our sympathy to the family of **Dr. Paul Gries** for the loss of his wife Virginia.

PERSONNEL CHANGES

FARWELL:

Wendy Boomer, CSA, Business and Administration-Student Activities/Cashiering Services (Debit Card/Cashier) (5/19/00)

Kent Brown, CSA, Faculty/Staff Club (5/12/00)

Douglas K. Lange, Exempt, Vice President and Dean of Students Office (5/15/00)

Brian Steinberg, Exempt, Residence Life (3/31/00)

Janet Larsen, CSA, Little Miner's Clubhouse (3/2/00)

WELCOME:

Brenda Standiford, Non-Unit Faculty, Devereaux Library, Assistant Librarian (5/15/00)

Trish E. Davis, CSA, Childcare Worker, Little Miner's Clubhouse (5/8/00)

Annette M. Bledsoe, CSA, Childcare Worker, Little Miner's Clubhouse (5/8/00)

Robin Stambaugh, CSA, Senior Secretary, University and Public Relations (5/1/00)

Paulette Palladino, Exempt, HPCNet Customer Service Representative, High Plains Center for Technology (4/1/00)

RECLASSIFICATION:

Rebecca Cronin, CSA, has accepted a Teacher Aide/Administrative Assistant I position in Little Miner's Clubhouse.

M. Pat Kung has been reclassified to a programmer/analyst in Instructional Technology Services retroeffective 2/7/00. She was previously classified as a Computer Support Supervisor in that department.

Donna Kliche, Exempt, has accepted the Research Scientist I/Computer Programmer position in IAS beginning 5/15/00.

Kristy Engle, CSA, has accepted the Payroll Assistant position in Human Resources.

accommodated, and Dr. Kerk knows the ergonomics that need to be addressed. "Together we find solutions." Dr. Kerk is currently one of two Certified Professional Ergonomists in the state of South Dakota.

The representatives from Black Hills Workshop in attendance at the students' presentation of the EAFB switchboard plan to heed almost all of their recommendations. "The ideas are excellent and the fact they come from trained engineers lends added weight when we try to implement some changes," said Ekberg.

"The experience was very beneficial," said Wilson. "Actually being on a project is so much different than the classroom. Not only do you have to use the techniques learned in class, but for me I tend to remember better what I have done rather than just regurgitating knowledge on a test and forgetting it. I also learn how to answer questions, prepare presentations, and work with learning how to communicate what I have done to people who are not industrial engineers."

Each semester Dr. Kerk and the students in IENG 311 and IENG 321 try to work with different companies and organizations, and gain different experiences. The projects entail no risk on the company's behalf, and the end result is hopefully a workable solution to their problem(s). Industrial engineers take a step back and look at the big picture. The engineers take a systems approach to solving a problem by looking at all aspects of the system including management, people, and statistical applications. To date 15 companies have benefited from the industrial engineers approach at SD Tech. When is it going to be your turn?

For more information about the industrial engineering programs, contact Dr. Kerk at ckerk@silver.sdsmt.edu, or 605.394.1271/6067.



STUDENT SPOTLIGHT

A six member student team from Tech attended the Rocky Mountain American Institute of Chemical Engineers (AIChE) Student Chapter Regional Conference March 24, 2000 at the University of Utah, Salt Lake City. The Tech team placed third in the poster competition and first in the car race competition. Tech's team members are: **Ryan Caldwell** (ChE, Sioux Falls), **Brooks Pettit** (ChE, Aberdeen), **Jason Herr** (ChE, Aberdeen), **Traci Costello** (ChE, Sioux Falls), **Eric Swanberg** (ChE, Bloomington, MN), and **Tim Gramith** (ChE, Norwood, MN).

Five students from SDSM&T competed in the William Lowell Putnam Mathematical Competition. Students from Tech who competed were **Nathanael Reid** (MATH, Kennewick, WA), **Brandon Yares** (CENG, Brooklyn Park, MN), **Jamil Higgins** (MATH, Rapid City), **Kathleen Peterson** (MATH, Rapid City), and **Ryan Mayer** (MATH, Rapid City). Nathanael Reid fared the best out of the pack with a score of ten which put him in 729th out of 2900 students. He was the top finisher in the state of South Dakota. Of the 2900 students, 1746 scored a zero. The top score was a 74.

The SDSM&T Chapter of Tau Beta Pi congratulated the newest members that were initiated this spring. The new senior candidates are **Kjartan Austad** (EE, Norway), **Jeremy Chilton** (CEE, Hillsboro, MO), **Jason Fink** (ME, Black Hawk), **Jason Hagerty** (CEE, Deadwood), **Nate Kleinschmit** (IE, Canton), **James Landrigan** (GEOE, Bridgeport, NE), **Jan Lanne** (ME, Norway), **Holly Lipp** (CEE, Rapid City), **John Rishea** (CSC, Rapid City), **Preston Schneider** (CSC, Rapid City), and **Brad Stock** (GEOE, Sturgis). The new junior members are **Chris Baer** (CEE, Freeman), **Karen Carda** (ME, Rapid City), **Jaron Cockrum** (CEE, Lead), **Michael Dostie** (EE, Ellsworth Air Force Base), **Chris Kinder** (CSC, Rapid City), **Michael Pogany** (CEE, Rapid City), **John Schaefer** (EE, Box Elder), **Amber Schmidt** (ME, Aberdeen), **Greg Stayer** (ME, Rapid City), **Kent Story** (EE, Spearfish), and **Jim Van de Ven** (ME, Long Lake, MN). New officers for the 2000-01 school year are **Jason Thuringer**

(ME, Rapid City), President; **Nate Kleinschmit**, Vice President; **Melinda Riley** (EE, Rapid City), Corresponding Secretary, and **Karen Carda**, Recording Secretary.

Lars Weiershaeuser (MS GEOL, Rapid City) and **Dr. Colin Paterson**, Professor, Department of Geology and Geological Engineering, presented a paper at the Rocky Mountain Section of the Geological Society of America in Missoula, MT on April 17-18. It was on The Calumet Cu-Ag-Au deposit in the Black Hills, South Dakota: Hydrothermal veins, massive sulfides, or SEDEX deposit?

Belal Hansrod (MS GEOL, Mauritius) has been awarded a Hugh E. McKinstry grant by the Society of Economic Geologists. The grant of \$1,000 is to help to cover expenses for research on "Application of hyperspectral remote sensing for geological mapping and resource evaluation related to alteration and mineralization in carbonate-dominated terranes of the Otavi Mountainland, Namibia". Belal advisor's are **Dr. Colin Paterson**, Professor, Department of Geology and Geological Engineering, and **Dr. Edward Duke**, Research Associate Professor, Department of Geology and Geological Engineering.

The SDSM&T Human Powered Vehicle (HPV) team competed at the annual American Society of Mechanical Engineers HPV Competition May 5-7 at Chico State University in California. Team members were: **Ben Storms** (ME '00), **Nicolas Igl** (ME '00), **Mark Fauske** (ME, Wall), **Karen Carda** (ME, Rapid City), **George Deering** (ME, Belle Fourche), **Cassidy Fitzpatrick** (ME, Sioux Falls), and **Kurt Smith** (ME, Rapid City). **Dr. Chris Jenkins**, Professor, Department of Mechanical Engineering, is the faculty advisor, and **Dr. Carter Kerk**, Assistant Professor, Department of Industrial Engineering, is the assistant faculty advisor. This year's HPV, nicknamed *Ghost Rider*, placed 14th overall out of 26 competitors in the single rider division.

The SDSM&T Mini-Baja team competed in the Western Competition Thursday April 27-29 at Kansas State University in Manhattan Kansas. Senior team members

are team leader **Charles Cox** (ME '00), **Jarid Shawd** (ME '00), **Shawn Ericsson** (ME '00), **Jamie Leclair** (ME '00), **Jim Sebert** (ME '00), **Terra Stroup** (IENG '00), and **Neil Schroetlin** (ME '00). The underclass team members are **Don Wishard** (ME, Lantry), **Jaaron Johnson** (ME, Rapid City), **Dan Sellars** (ME, Greybull, WY), **Lee Gunderson** (ME, Watertown), and **Erin Lachman** (ME, Rapid City). SDSM&T had two vehicles in this year's competition. The two vehicles finished 53rd and 73rd respectively with total scores of 560.105 and 374.518 out of a possible 1,000 points.



In April the SDSM&T Mining & Mucking Team traveled to Montana Tech University in Butte, Montana to compete in the 22nd annual Intercollegiate Mining & Mucking Competition. The SDSM&T women's team consisted of **Michelle Lammers** (MET, Cranberry Township, PA), **Jill Swanhorst** (MATH, Chelsea), **Amber Schmidt** (ENGR, Aberdeen), **Mandy Lilla** (MINE, Hecla), and **Sara Workman** (GEOE, Moorcroft, WY). The men's team consisted of **Krystal Lubke** (GEOE, Rutland, ND), **Josh Price** (GEOE, Rapid City), **Scott Johnson** (EE, Moose Lake, MN), **Nick Beukema** (MINE, Hayfield, MN), and **Paul Chilson** (MINE, Sisseton). In the women's division SDSM&T took 2nd place in hand steeling, mucking, and swede sawing. The men placed 1st in gold panning.



RESEARCH NOTES

SDSM&T won the Rocky Mountain Regional Concrete Canoe Competition held April 7-9 at Brigham Young University. At the National Concrete Canoe Competition held in Golden, Colorado, in June, Tech placed 11th overall out of 26 competing teams. Team members include: **Rich Anderson** (CEE, Rapid City), **Chris Baer** (CEE, Freeman), **Charlie Baker** (MS '00), **Andy Baker** (ENGR, Sturgis), **Jed Brich** (CEE, Ogallala, NE), **Jim Cokely** (CEE, Scotland), **Ryan Koontz** (ME, Sturgis), **Miriam Grenz** (CEE, Bismark, ND), **Kevin Potts** (ENGR, St. Helena, NE), **Trygve Trovik** (ME, Norway), **Josh Warren** (CEE, Sheridan, WY), **Jessica Gould** (CEE, Black Hawk), **Rhaub Walker** (CEE, Rapid City), **Karen Carda** (ME, Hermosa), **Heidi Anderson** (CEE, Rapid City), **Randy Ringstmeyer** (CEE, Winner), **Donnie Slag** (CEE, Dickinson, ND), **Liz Stout** (CEE, Rapid City), **Mike Towey** (CEE, Rapid City), and **David Tullis** (CEE, Rushville, NE). Jed Brich and Kevin Potts were co-chairs of the concrete canoe competition, and Justin Fejfar and Josh Sletten were co-chairs of the steel bridge competition. **Beau Obrigewitch** (CEE, Wiboux, MT) is President of the SDSM&T ASCE chapter, and **Dr. M.R. Hansen**, Associate Professor, Department of Civil and Environmental Engineering, is the faculty advisor.

PUBLICATIONS

Dr. Roger Johnson, Associate Professor, Department of Mathematics and Computer Science, had his note, "Simple random sampling," accepted for publication in the "Technology Tips" section of the *Journal Mathematics Teacher* this coming fall. This note describes how simple random sampling without replacement may be implemented on Texas Instruments 83, 83-plus, 89, and 92 calculators.

Roger Dendinger, Assistant Professor, Department of Social Sciences, was awarded \$2,000 from the South Dakota Humanities Council for his project entitled "The Norwegian Connection: Educational Chain Migration."

Dr. Jeff McGough, Assistant Professor, Department of Mathematics and Computer Science, was awarded \$22,238 from the University of Nevada-Reno (prime-NSF) for his project entitled "A New On-Line Mathematics Testing, Remediation and Assessment Strategy for Engineering Majors."

Dr. Sherry Farwell, Dean, Graduate Education and Sponsored Programs, was awarded \$14,400 in additional funds from the University of North Dakota (prime-NASA) for his project entitled "Public Access Resource Center (PARC) Empowering the General Public to use EOSDIS-Implementation Phase III." Dr. Farwell was also awarded \$212,500 in additional funds from the National Aeronautics and Space Administration (NASA), for his project entitled "South Dakota Space Grant Consortium." Additionally, Dr. Farwell was awarded \$16,800 from the University of North Dakota (prime-NASA) for his project entitled, "UMARC – PARC Project."

Dr. Julia Sankey, Haslem Postdoctoral Fellow, Museum of Geology, was awarded \$13,600 from the Earthwatch Institute (Durfee Foundation) for her project entitled "Dinosaurs and Other Cretaceous Wildlife of Big Bend National Park, Texas."

Dr. Pat Zimmerman, Chair, Director, Professor, Institute of Atmospheric Sciences, was awarded \$250,000 from the Governor's Office - State of South Dakota for his project entitled "South Dakota Carbon Sequestration Project."

Dr. Mark Hjelmfelt, Professor, Institute of Atmospheric Sciences, was awarded \$122,600 in additional funds from the National Science Foundation for his project entitled "Mesoscale Boundary Layer Structures Observed During the Lake-Induced Convection Experiment (Lake-ICE)."



Dr. Chris Jenkins, Professor, Department of Mechanical Engineering, was awarded \$17,229 in additional funds from the Boeing Company for his project entitled "Finite Element Modeling and Experimental Studies of Membrane Mirrors."

Dr. William Cross, Research Scientist III, Department of Materials & Metallurgical Engineering, **Dr. Ed Duke**, Manager, Engineering & Mining Experiment Station, **Dr. Jon Kellar**, Associate Professor, Department of Materials & Metallurgical Engineering, and **Dr. Ken Han**,



Distinguished Professor, Department of Materials & Metallurgical Engineering, were awarded \$57,696 from the South Dakota Department of

Transportation for their project entitled "Stainless Steel Clad Rebar in Bridge Decks."

Dr. Sanjeev Khanna, Assistant Professor, Department of Mechanical Engineering, was awarded \$210,000 from the National Science Foundation for his project entitled, "CAREER: Innovative Research and Teaching in Modern Welded Structures Engineering and Design."



Julie Smoragiewicz, Vice President for University and Public Relations, was awarded \$10,000 from the South Dakota State Historical Society for renovation of the Children's Science Center's North Wing.

You Are Invited . . . Calendar of Events

JULY

Tuesday, July 4
Fourth of July - Holiday

Wednesday - Friday, July 5 - 28
Technology for Teaching & Learning

Wednesday, July 5
Reunion Warm Up Day, 1:00 pm - 7:30 pm

Wednesday - Friday, July 5 - 7
Children's Science Center - Build your own model rocket ages 8 - 12

Thursday, July 6
Reunion Day One, 6:30 am - 8:00 pm

Friday, July 7
Reunion Day Two, 6:00 am - Evening

Saturday, July 8
Reunion Day Three, 6:00 am - 10:30 pm

Monday - Friday, July 10 - 21
Jurassic Dinosaurs and Mammals Field Dig
South Dakota Dinosaurs in the Hell Creek Field Dig

Tuesday - Wednesday, July 11 - 12
Children's Science Center - Explore Flight: ages 8 - 11

Thursday, July 13
Children's Science Center - Water Rockets: ages 7 - 11

Monday - Friday, July 17-28
Monster Marine Reptile Field Dig
Giant Pigs & Rhinos in Badlands
National Park Field Dig

Tuesday - Friday, July 18 - 21
Children's Science Center - Bottle Biology: ages 6 - 9

Tuesday - Thursday, July 25 - 27
Children's Science Center - Build your own model rocket ages 8 - 12

Monday - Friday, July 31 - August 11
Marine Turtles, Mosasaurs, and Plesiosaurs Field Dig

AUGUST

Tuesday - Friday, August 1 - 4 & 8 - 11
Children's Science Center - Explore the Universe: ages 8 - 12

Thursday - Friday, August 17 - 18
Summer Orientation Session

Thursday, August 17
Support Staff Breakfast - Welcome back & Training

Monday, August 28
Opening Convocation, 10 am

SEPTEMBER

Friday - Saturday, September 1 - 2
Women's Volleyball @ Sheridan Tournament

Saturday, September 2
Men's Football @ Concordia of St. Paul

Sunday, September 3
First day to move into Residence Halls

Sunday - Sunday, September 3 - 10
New Student Orientation

Monday, September 4
Labor Day

Tuesday, September 5
Registration Day
Women's Volleyball @ Mount Mary
President's Picnic 5 - 6:30 pm

Wednesday, September 6
First Day of Classes

Thursday, September 7
Fee Payment Due

Saturday, September 9
Men's Football against Dickinson State, 1 pm
Cross Country Robbinsdale Park

Monday, September 11
Women's Volleyball @ Nat'l Amer. Univ., 5 pm

Wednesday, September 13
Women's Volleyball @ University of Mary

Thursday, September 14
Last day to add/drop & adjust fees

Friday, September 15
Deadline for Textbook Refunds

Saturday, September 16
Women's Volleyball @ Sheridan
Men's Football @ Jamestown College
Cross Country Meet

Sunday - Saturday, September 17 - 23
M-Week (Homecoming)

Tuesday, September 19
Women's Volleyball @ B. H. State Univ.

Thursday, September 21
M-Week Royalty Coronation
Corporate Cup

Friday, September 22
M-Day Picnic
M-Hill Climb
Women's Volleyball @ Concordia Tournament

Saturday, September 23
M-Day parade
Football game against Huron University, 1 pm
M-Week Dance
Women's Volleyball @ Concordia Tournament

Tuesday, September 26
Women's Volleyball against Dickinson State, 7 pm

Friday - Saturday, September 29 - 30
Women's Volleyball Tech Tournament
Cross Country @ B.H. State University

Saturday, September 30
Men's Football @ Mayville State

OCTOBER

Wednesday, October 4
Women's Volleyball against Minot State, 7 pm

Thursday - Friday, October 5 - 6
Board of Regents meetings @ Tech

Friday, October 6
Women's Volleyball @ Huron University

Saturday, October 7
Men's Football against University of Mary, 1 pm
Cross Country @ Rocky Mountain Shootout

Monday, October 9
Native American Day (no classes)
Columbus Day

Tuesday, October 10
Women's Volleyball against Nat'l. Amer. Univ., 7 pm

Friday, October 13
Women's Volleyball against University of Mary, 7 pm

Saturday, October 14
Men's Football @ Dakota State University
Cross Country Meet

Monday, October 16
National Boss Day

Tuesday, October 17
Women's Volleyball against Chadron State, 7 pm

Friday - Sunday, October 20 - 22
Tech Family Weekend

Friday - Sunday, October 20 - 22
Women's Volleyball @ B.H. State Univ.

Saturday, October 21
Men's Football against B. H. State Univ., 1 pm
Cross Country Meet

Monday, October 23
Last Day to Register to vote in Nov. elections

Thursday, October 26
Women's Volleyball against B. H. State Univ., 7 pm

Saturday, October 28
Men's Football against Valley City State, 1 pm
Cross Country Meet

Sunday, October 29
Daylight Savings Time Ends - set clocks back one hour

Tuesday, October 31
Halloween



Tech Trivia

Did you know...

Tech Trivia

• The school's first commencement exercises were held May 31, 1888, at the Methodist Church.

• October 5, 1912, was the first M-Day. "M" Hill was established by excavating an "M", filling it with boulders, and whitewashing it.



• ROTC cadets William Rowe (ChemE '51) and Ralph Johnson (ChemE '52) won the Society of Military Engineer Award in 1951.

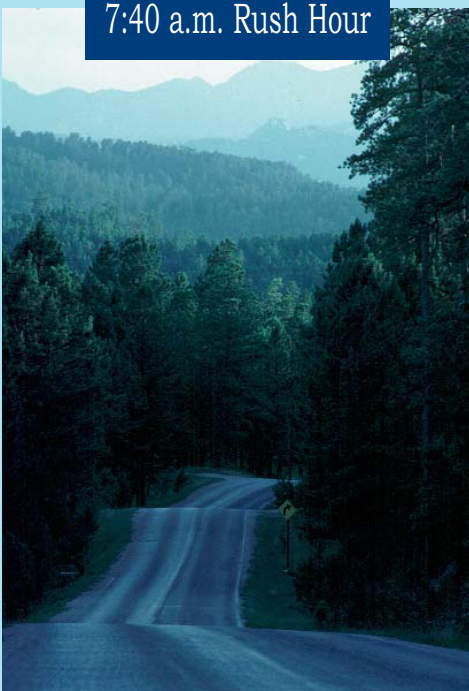


IN THE NEXT ISSUE...

- Concrete Canoe
 - John Colgan Donation
 - Dac-10 Athletic Conference
 - Martin & Associates
 - TeAM
- and many more!

3,500 copies of this publication were printed
@ a cost of \$1.30 each (printing costs only).

7:40 a.m. Rush Hour



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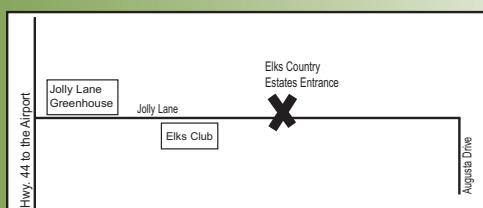
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