

South Dakota School of Mines & Technology

Legacy News

Foundation Update Edition



SOUTH DAKOTA

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SCHOOL OF MINES
& TECHNOLOGY

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June 2015

Music Department Receives Largest Gift to Date

The South Dakota School of Mines Music Program was recently gifted a unique collection of musical instruments and equipment from alumnus Paul J. Rafter (EE 80). Rafter's recent donation to the university includes multiple valuable, investment-quality musical instruments including numerous vintage guitars, organs and a beautiful Yamaha Mark IV Disklavier PRO grand piano in mint condition. The piano is commonly found in major recording studios.

Some of the instruments will be sold with the proceeds going toward the music department at Mines, and other instruments including Rafter's first professional gig rig, the 1967 Fender bass and Standel amp, will be kept for student use.

"The School of Mines gave me so much opportunity, and I wanted to do something in return, especially for the students," Rafter said.

Rafter grew up in Troy, N.Y. During his sophomore year in high school, he received an electric bass guitar and joined a band with other students at his high school. After Rafter graduated high school in 1967, his only aspiration was to continue playing music. He played professionally for eight years. His bands performed all throughout the northeast. They even recorded some original songs, one written by Rafter himself, which got local radio airplay. The highlight of his career while playing professionally was when his band was the opening act for the then very popular Vanilla Fudge. The bassist for Vanilla Fudge, Tim Bogert, was Rafter's idol. Getting the opportunity at age 19 to open for the Fudge, meet the band and swap basses backstage with Bogert was something Rafter would never forget.

Eventually Rafter realized that he could not be a professional musician forever, and that he needed to further his education. At the age of 25, Rafter sold all of his music equipment to fund his first year of college.

Starting in 1975, Rafter attended a two-year college in Troy majoring in electrical engineering technology. He had been out of school for many years, and he said the first quiz he took at the college received an F as a grade. "I took

she described it as a low cost, highly respected institution, so he thought he would give it a try. He contacted the head of the electrical engineering department at the time, Lyle Feisel, Ph.D. "He accepted me into his program," said Rafter. "At that moment, my life changed forever for the better."

Rafter met with Bill Jones, the director of financial aid, who helped him apply for financial aid and got him a summer job as a counselor at the Rapid City Girls

and was the manager of its photography department his last year of school. While attending the university, there wasn't a well-developed music program like there is now. "I think it is truly great what Dr. Feiszli is doing with the music program at Mines," Rafter stated.

After graduating with his electrical engineering degree from Mines, Rafter made his way to Silicon Valley, Calif. He was hired by Hewlett-Packard Company (HP) as a sales representative selling computers to engineers. He worked as a sales rep for eight years and became the number one sales rep for his product line in northern California. He then started attending night school to earn his MBA in marketing and became a product manager for HP for the next 10 years, then a software design engineer in the hardware support division for the next three years. He often traveled throughout the U.S. and to Europe visiting England, France and Switzerland. The traveling was hard on his health so he later took on the role of writing code for the company's internal applications.

After 21 years with HP, Rafter left the business. He began playing music again and performed with a couple of bands but ended up retiring shortly after because of his health. Rafter has read all of the *Hardrock* magazines and the *Foundation Update* newspapers and saw several articles on the music program at Mines and thought the school needed to add some rock n' roll to its program. Rafter contacted the SDSM&T Foundation to explore his options on gifting to the university. He decided to donate all of his guitars, organs, amps and piano to the SD Mines music program. Music Director James Feiszli, Ph.D., noted, "The donation of rare and valuable

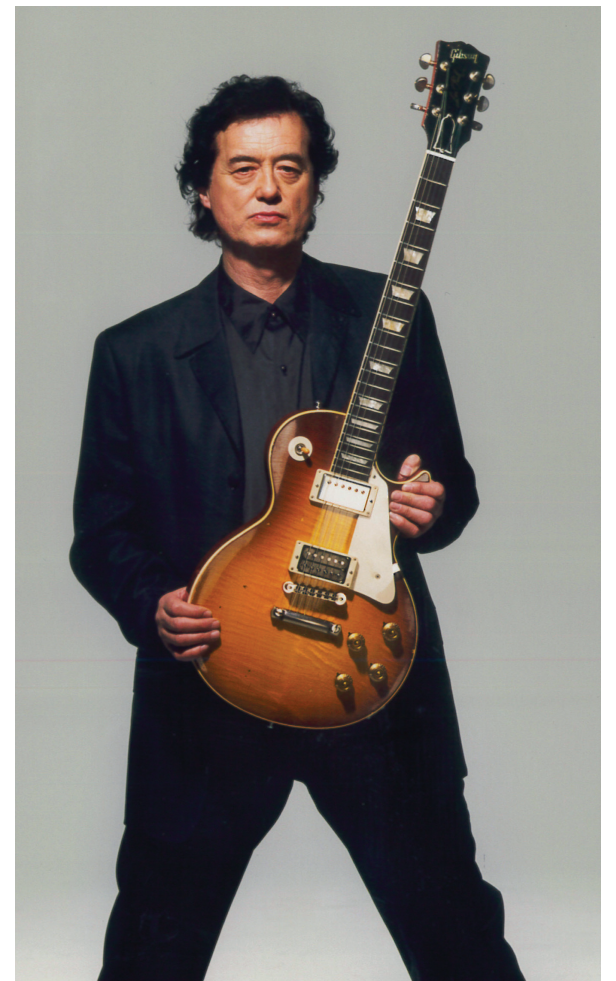
musical instruments to SDSM&T Music by Paul J. Rafter is to date the single most significant gift to the music program in my thirty years at the institution. These instruments will have a huge impact on future generations of SDSM&T students in terms of both development and education. I see Paul's gift as a testament to the impact that music can have on one's life regardless of career path," Feiszli said.

"While I played rock for a living for a while, I have since childhood always listened to all kinds of music, classical being a favorite. Not everybody can play classical or jazz or sing in an a cappella choir, but many people can play rock and other forms of mainstream music. I hope the gifts of my instruments will allow more students to get involved playing some of everything. That would make me happy," Rafter said.

The piano donated by Rafter was played by a student in the Spring Choral Concert at the Music Center on April 24. When the students are back in the fall, they will be delighted to have a whole new array of musical instruments available for them to use to rock out. "When I think of Mines, I think about the great experience I had and the chance they gave me. I hope my gift will help urge all students to be thankful of their experiences and in return want to give in the future to their favorite causes. I also hope they take this opportunity to rock," Rafter stated.

The collection of over 40 guitars gifted by Rafter includes No.19 of 25 Les Pauls played, approved, hand numbered and signed by Jimmy Page from the band Led Zeppelin; one of fourteen custom finished Les Pauls signed by the Edge from the band U2; and several signature and limited edition electric and acoustic guitars, electric basses and amplifiers. Don Lerdal, vintage musical instrument dealer who viewed the collection said, "I truly was and continue to be absolutely stunned and a bit overwhelmed by the generosity of this man. To me, the spirit behind this donation is far more than the monetary value. That is what impressed me the most. The Hammond organ 1963 B-3 setup is probably among the best anywhere in the world. The guitar amps are in amazing condition. The guitars are all just superb. Among this collection are several very limited production instruments that will never be available again. It's humbling to be the caretaker of this collection." While most items are recently manufactured, many are vintage dating as far back as 1935. The collection is being held in a secured location off campus until such time that they can be sold. For those interested in purchasing an instrument, please email Don Lerdal at foundationguitars@gmail.com.

The School of Mines is very thankful to Rafter and his generous donation of the music instruments.

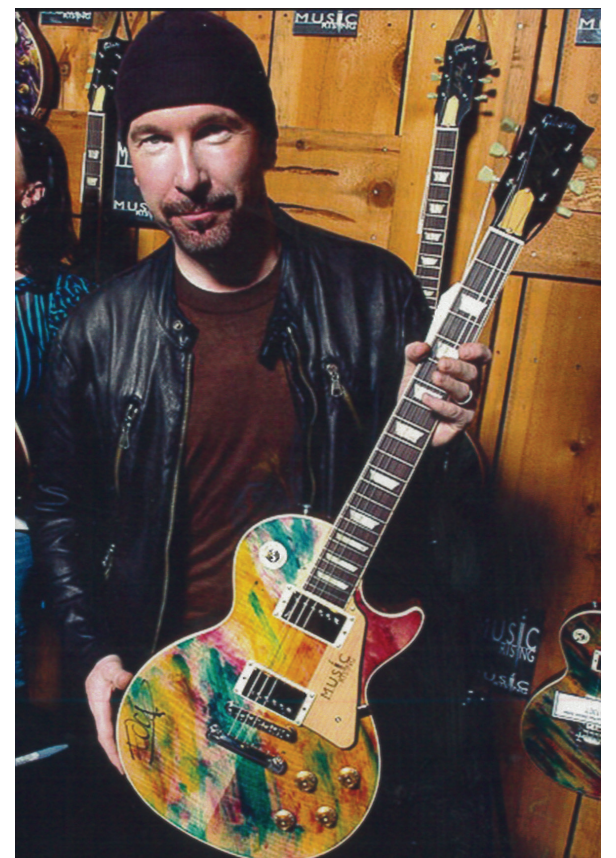


Jimmy Page, from the band Led Zeppelin, with the Les Paul he signed



Mines incoming junior Jake Swanson admiring the Paul J. Rafter music collection

Cover photo: Yamaha Mark IV Disklavier PRO grand piano, part of the Paul J. Rafter music collection



The Edge, from the band U2, with the custom finished Les Paul he signed

Grads Continue to Enjoy High Job Placements, Starting Salaries

New graduate placement figures for SD Mines show that 98 percent of students who earn a bachelor's degree secure a job in their field of study or pursue an advanced degree within the first year.

The 2013-2014 academic year graduates who directly entered the workforce received an average starting salary offer of \$63,358, according to new figures released by the university.

Of last year's SD Mines bachelor's degree graduates, 211 had secured jobs in their field of study and 65 enrolled in graduate school.

The average starting salary offers for eight majors at SD Mines are higher than the national average for those disciplines. Geology, the university's top salary-earning major at \$73,000, far exceeds the national average of \$55,534.

A SD Mines average starting salary for computer engineering is \$69,286, also exceeding the national average of \$68,053. Other average starting salaries for SD Mines degrees are \$68,039 for mining engineering; \$66,971 for chemical engineering; \$66,250 for physics; \$65,571 for computer science; \$65,376 for geological

engineering; \$64,750 for metallurgical engineering; \$64,556 for electrical engineering; \$63,350 for mechanical engineering; and \$62,568 for industrial engineering.

Overall top employers based on the number of Bachelor of Science hires include Baker Hughes,



Caterpillar Inc., Cargill, Dow Chemical, Microsoft, Burns & McDonnell, Freeport McMoran, Kiewit and Flint Hills Resources/Koch Industries.

The university continues to be an economic development driver for the state. Of the 211 graduates with jobs, 81 stayed to either live and work in South Dakota or seek an advanced degree.

"Mines graduates are well-prepared leaders in engineering and science, and industry

recognizes it. Our students are in high demand," said Heather Wilson, president of SD Mines.

Thirty-six graduates live and work in the state for 26 different employers in 12 South Dakota communities. Among them:

Aberdeen (3M, Molded Fiber Glass South Dakota)
Mitchell (Innovative Systems)
North Sioux City (Nutra-Flo)
Philip (Scotchman Industries)
Pierre (DOT, DENR)
Rapid City (RPM, RESPEC, KLJ, Ferber Engineering)
Sioux Falls (Raven, POET, DocuTap)
Vermillion (Masaba Mining Equipment)
Yankton (Vishay, Gehl)

PayScale, a third-party validator of compensation figures throughout the country, last fall placed the early-career salaries (those within the first few years of a B.S. degree) of Mines graduates at \$65,600. The PayScale rating is often used as a reference point by mainstream media, bringing national exposure to SD Mines in stories about the top returns on investment at U.S. colleges and universities.

Hinricher Named Goldwater Scholar

Mines student Jesse Hinricher, has been named a 2015 Barry Goldwater Scholar. The chemical engineering and chemistry double major from Pipestone, Minn., was one of 260 students nationwide selected from a pool of 1,206 to receive the prestigious award, which carries a maximum scholarship of \$7,500 for up to two years.

Hinricher, who will graduate in 2017, plans to pursue a Ph.D. in medicinal organic synthesis to research a pharmaceutical cure for diseases such as cancer and Alzheimers.

During his time at Mines, he's shown an impressive versatility in his research. Last year, he completed a NASA internship at the Kennedy Space Center.

"NASA's next endeavor is to establish human colonies on other celestial bodies. I had the privilege of contributing to the pilot mission set to launch in 2018, which will determine the feasibility of using autonomous robots to search for, analyze and harvest resources."

On campus, Hinricher is in the American Chemical Society, Alpha Chi Sigma Fraternity – Beta Phi Chapter, American Institute of Chemical Engineers and Students for the Exploration and Development of Space.

"Jesse is a great student, and I'm very pleased that he has earned this honor," said Heather Wilson, SD Mines president. "The best students at Mines can compete with the best students anywhere, and it's good to see more of our exceptional students applying for scholarships like the Goldwater, Mitchell, Udall and Rhodes."

Rust Named Udall Scholar, Plans to Pursue Tribal Land Sustainability

South Dakota School of Mines & Technology junior, Tyler Rust, from Rapid City has been awarded the \$5,000 Udall Scholarship, one of five prestigious, national scholarships established by the U.S. Congress. Rust is the second SD Mines student to ever win the scholarship.

The \$5,000 scholarship comes with a four-day orientation in Tucson, Ariz., where Rust will meet with other scholars from across the country, elected officials and environmental and tribal leaders.

A geology major and geospatial technology minor, Rust chose his field of study to protect and develop tribal public policies with an eye to environmental concerns, sustainability and stewardship of land.

"Because tribal public policy is heavily dependent upon maintaining tribal lands, a solid background in earth sciences will help me not only to understand tribal environmental issues but also to help solve them," he said.

"The best students at Mines can compete with the best students anywhere," said Heather Wilson, president of the School of Mines. "We are very proud of Tyler, and I know this scholarship will help enable his continued development as a leader."

Rust serves as vice president of the Norbeck Society and president of Norbeck Uni and is also involved in Student Association Senate,

Society of Economic Geologists and Tech Geological Association. He has presented at the American Indian Science & Engineering Society (AISES) national conference and served as an AISES travel scholar in New Mexico.

A National Science Foundation (NSF) Tiospaye Scholar and All Nations AMP Scholar, Rust also pursues research in geology, water resources, sustainable housing, solar energy and archaeology as part of the NSF Pre-Engineering Education Collaborative Program in partnership with Oglala Lakota College. In collaboration with other Mines students, Rust helped build a greenhouse on the Pine Ridge Reservation, bringing fresh produce to a U.S. Department of Agriculture-declared food desert.

Mines student Vaughn Vargas, last year's Udall Scholar, has been named as an alternate this year, which is a first for SD Mines.



Mazzucco 1st from SD Mines to Win CEIA Award

School of Mines student and recent Intel intern, Mark Mazzucco, was selected as the national recipient of the 2015 Academic Internship Student Achievement Award. Mazzucco is the first Mines student to have ever earned the honor, awarded by the Cooperative Education & Internship Association (CEIA).

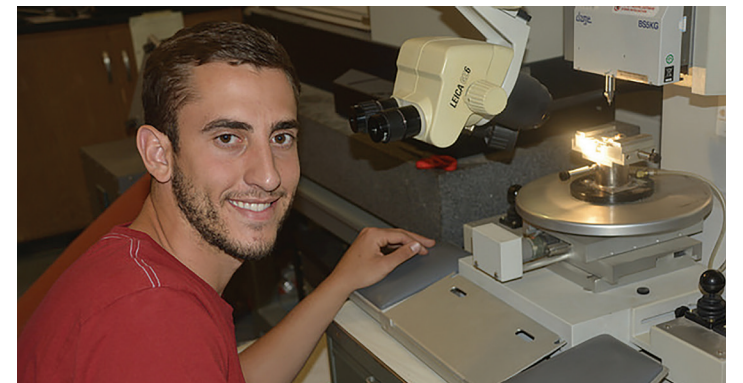
Mazzucco, a junior metallurgical engineering major from Mesa, Ariz., served as a process engineer intern for Intel last summer, where he was also awarded Intel Intern of the Week and ranked first on Intel's Vanguard for community volunteering.

"Mark is very deserving of this honor. He is an exceptional student, leader and scholar-athlete and a great example of the more than three-quarters of our students who not just gain experiences through internships but who make a big impression by immersing themselves in their work and surrounding community," said Heather Wilson, SD Mines president.

Mazzucco previously earned a bachelor's degree in psychology at Arizona State University (ASU). When he was given the chance to join the NCAA Division II basketball team at Mines, he leapt at the opportunity.

"I chose Mines because both my brother and father are engineers, and they had always encouraged me to pursue engineering. I got the opportunity to play basketball with a scholarship and study engineering. Being able to reach my dream of playing collegiate basketball along with getting to pursue an engineering degree was ultimately the combination that brought me to Mines," Mazzucco stated.

At Mines, Mazzucco is a contributing member of the basketball team and has maintained a 4.0 grade point average. He was named to the National Association of Basketball Coaches Honors Court last year for his achievements. Mazzucco is also the lead for the Micron Design Team at Mines, working as part of a four-person student team in partnership with Micron, a multinational company specializing in



semiconductor devices, on a project of the company's choice to gain hands-on experience in industry. Mazzucco is very appreciative to have received scholarships to help him attend the School of Mines. His hard work is what brought him here in the first place.

"Scholarships have allowed me to continue my success both on the court and in the classroom without the constant worry of going deeply into debt. I can't thank the donors enough for their generosity and kindness in creating the scholarships that not only allow me, but many other students, to excel in the classroom rather than having to work multiple jobs. I know that through their generosity, I have made it my goal to become successful enough to one day be a donor myself," Mazzucco said.

Mazzucco serves on the Society of Mining, Metallurgy and Exploration Executive Board as his department's spokesperson. In the community, Mazzucco tutors and partners with School of Mines and the special needs community as part of the Mines Buddies program.

He plans on pursuing a master's degree in materials science engineering at Mines following graduating in May of 2016.

Caterpillar VP & Chief Technology Officer Tours CAT Lab



Gwenne Henricks (center front right), Caterpillar Inc. vice president and chief technology officer, visited the Caterpillar Student Excellence Center laboratory at the South Dakota School of Mines & Technology in Rapid City, S.D. Henricks met with South Dakota Mines President Heather Wilson (center front left) and other leaders to discuss strengthening the longstanding partnership between the two.

SD Mines Teams Win Governor's Giant Vision Business Plan Competition

South Dakota School of Mines & Technology faculty and students earned top honors in this year's Governor's Giant Vision Business Competition. In the business division, Mines teams tied for first place and also took third place. A Mines team also won the student division of the annual competition.

After a preliminary judging process that reduced the field of applicants to eight qualifying business and 10 qualifying student entries, the competition concluded with day-long judging activities April 15 at the Sanford Research Center in Sioux Falls. The awards were presented as part of the Governor's Office of Economic Development banquet with Governor Dennis Daugaard presenting the top prizes in both competitions.

This is the third year in a row a Mines-affiliated start-up has won the senior division of the business competition.

"South Dakota is a great place to start a business," said Mines President Heather Wilson. "The Governor's Giant Vision Competition encourages student and faculty entrepreneurs to move their innovations from the lab bench to the marketplace. We're very proud of these teams and look forward to their future success."

BUSINESS DIVISION

Run by Rob Hrabe, president, and Christian Widener, chief technology officer, VRC Metal Systems tied for first place in the business competition, taking home a \$15,000 prize. Widener is an associate professor in mechanical engineering and materials and metallurgical engineering and the director of the Arbegast Materials Processing and Joining Laboratory at Mines.

VRC Metal Systems is a 2012 startup that emerged out of research at Mines' Army Research Laboratory and Repair, Refurbish and Return to Service (R3S) Center. The company specializes in making turnkey systems for cold spray and additive manufacturing through an advanced materials process technology it developed.

The company's technologies have applications in aerospace, defense, heavy industrial, oil and gas, biomedical, electronics, consumer products, and repair and refurbishment of high-value components. VRC is building on the more than \$7.5 million spent to develop the technology at South Dakota Mines, has exclusively licensed three cold spray-related patents and is the only domestic manufacturer of high-pressure cold spray equipment. With only three major competitors worldwide, VRC is well positioned to successfully lead the global cold spray market.

Last year, Mines faculty members Todd Menkhaus and Hao Fong and entrepreneur Craig Arnold of Nanofiber Separations came in first in the business competition, and the year before alumnus Mat Peabody's CalxAqua took home the prize.

Third place in the business division and a \$5,000 prize was awarded to Module Innovations, founded by Mines graduate student Vivek Agarwal, materials engineering and science master's candidate, and Sachin Dubey.

With prototypes currently in testing, Module Innovations is set to hit the \$221 billion food processing industry with its product Bactisense™, a color changing strip that detects harmful bacteria, like E. coli, in food and water within minutes.



Top photo, from left: Mines junior Conrad Farnsworth and Gov. Daugaard; Bottom photo: Christian Widener and Rob Hrabe of VRC Metals with Gov. Dennis Daugaard

Food pathogens cause 48 million illnesses in the U.S. alone. The global numbers are even more staggering, impacting individuals and food companies alike. While current bacteria detection methods are slow, expensive and instrument-dependent, Bactisense™ requires no lab or instrumentation. The convenient, easy-to-use strip could be used by a layman, promising to save millions of dollars for food companies.

STUDENT DIVISION TOP HONORS

The first-place, \$5,000 winner in the student division was Farnsworth Downs Technology, cofounded by Conrad Farnsworth, a junior electrical engineering major at SD Mines from Newcastle, Wyo., and Siouxsie Downs, a nuclear engineering major at Iowa State University.

Farnsworth Downs Technology has designed small-scale liquid fluoride thorium molten salt reactors. These small, portable, modular and rugged power generators can be used in everything from water desalination to setting up emergency power in the event of a disaster or grid failure. These reactors will drastically reduce the cost of power and water purification while reducing nuclear waste stockpiles, which it would use as fuel.

The SD Mines Cycling Club



There are many ways students can keep busy outside of their schoolwork while attending the School of Mines. Many students choose to be a part of one or more student organizations. With over 100 student organizations to choose from and more being established every semester, there is something for everyone.

The Cycling Club was created with the express purpose of promoting the participation and interest in cycling on the School of Mines campus. Membership is open to any student, faculty or staff member who shares an interest in the sport of cycling, be it mountain, road, track or recreational. There are as many as 25 people who attend the club meetings ranging from freshmen to seniors and include both men and women. The largest bicycle ride consisted of 12 people who represented eight states and four countries.

The Cycling Club attempts to ride multiple times every week if weather permits. In the fall, the club will partake in road riding every Tuesday and mountain riding every Thursday. They also meet once a month for organizational/informational meetings.

The club participated in 30 Days of Biking, a national challenge to ride a bike every day in the month of April. For every 30 people who pledge to take the challenge, a bicycle will be donated to Free Bikes 4 Kidz. The challenge is great for raising cycling awareness throughout the community, and it is a great cause. The Mines Cycling Club has participated in further volunteer work by helping local groups build and maintain trails throughout the Black Hills. In addition, three members of the club recently made a special volunteer trip to Sioux Falls to fix five donated bicycles to give to underprivileged Native American children. Jace Doan, a senior mechanical engineering major and president of the Mines Cycling Club, stated, "I'm passionate about riding, and I love that I can connect with others who share the same passion. As far as riding goes, it has been great to pull together the cycling community at Mines. It is incredibly fun to get someone who is new to riding to join the club and watch their skills progress through the years."

Jane Dirksen Smith and her husband Lee Smith have been great supporters of the club. They established an endowment for the Cycling Club at the School of Mines in memory of their late son, Paul, who attended Mines as a freshman and was a cycling enthusiast. "We are immensely grateful for the support we receive. The endowment and other donations have allowed us to focus on growing the club and planning exciting events. The support takes a lot of stress out of an already packed and hectic schedule," said Doan. Additionally, the Paul Dirksen Smith Memorial Scholarship is a great way to recognize members who are involved in cycling and have made a strong impact in the Mines cycling community.

The future plans of the cycling club include making trips to nearby states to expose members to new terrain and greatly improve members' skills. They also would like to continue to grow and diversify. To accomplish that, they are starting a racing team that will travel to collegiate races in Wyoming, Colorado, North Dakota, South Dakota, Minnesota and other states. "We hope the racing team will pull in more students to not only the cycling club but to the university," Doan said.

The School of Mines Foundation wishes the best of luck to the future of the Cycling Club and to Jane Dirksen Smith and Lee Smith for their support of the club.

2015 Senior Gift



The 2014-2015 graduates comprise the first graduating class to ever give back to the School of Mines through the concept of a Senior Gift. The Senior Gift provides an opportunity for graduating seniors to donate to a project proposed and planned by the senior class.

Twenty-nine students gave to the senior gift in May contributing over \$1,300. President Heather Wilson also pledged to match what the seniors contributed thereby doubling the impact of the senior class gift. "It's great to see our young alumni giving back to others," said President Heather Wilson.

For the inaugural year of the Senior Gift, the class will fund the installation of a rock garden on the southeast corner of the Classroom Building. It will add to the aesthetics of this previously unadorned area. The design plan is to use boulders with attractive flowers and bushes as part of the landscaping between them. It will be installed in the summer of 2015. Students donating to the project started the senior tradition of giving back to their alma mater with an impactful gift to campus. Their name will appear on a plaque as a donor to the Senior Gift, prominently displayed in the Classroom Building.

The suggested amount of a one-time gift donation is based on the year students are graduating; hence \$20.15 for May, 2015, graduates. The students also had the choice of a recurring donation of \$20.15 per month for their first year out of school or a larger amount of their choice.

To make a contribution to the 2015 Senior Class Gift visit the Foundation website at <https://foundation.sdsmt.edu/senior-gift> or call the office at (605) 394.2436. It's not too late to get your name on the plaque if you make a gift prior to December 31.

SOUTH DAKOTA



SCHOOL OF MINES
& TECHNOLOGY

SD MINES FOUNDATION

306 E. Saint Joseph St. Suite 200
Rapid City, SD 57701



2015 FIVE YEAR ALL-SCHOOL REUNION JULY 8-12, 2015 ALUMNI.SDSMT.EDU

Stop by and see us!

Don't forget, July 8-12 is the 2015 Five Year All-School Reunion hosted at the SDSM&T campus and throughout the Black Hills. Enjoy many activities with other alumni and friends including the Hardrock Club Golf Classic, the Mines 130th birthday party, family picnic, pancake breakfast, M Hill climb, and many more. While you are on campus, stop by the Foundation and say hello! We would enjoy seeing you. We are located at 306 East Saint Joseph Street, Suite 200 across the street from Rocker Square.

Hope to see you then!