

THE HARDROCK™

SUMMER 2014

Groomed for
GREATNESS

SOUTH DAKOTA



SCHOOL OF MINES
& TECHNOLOGY



THE HARDROCK™

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Front cover: Doug Schlepp graduated from Mines in 1974 but continues to hold the All-Time Scoring Leader record.



12 BRIGHT YOUNG MINDS

Mentoring is among the things Mines does best. Students who connect with professors who stimulate and encourage them are three times as likely to be thriving in their overall well-being after college.



14 CHANGING THE NARRATIVE

Metallurgical engineering researchers are relying on technology to preserve history and discover more about secrets of the Native American past.



18 GROOMED FOR GREATNESS

Before **Doug Schlepp** (Met74) seized the reins at one of the top mineral processing equipment companies in the global mining industry, he slayed basketball records on the Hardrock court. His accomplishments are legendary, but Schlepp is by no means the only former student athlete who has gone on to become a captain of industry.



22 80 YEARS YOUNG

The School of Mines Alumni Association celebrates its eightieth anniversary this year as it ramps up for the next All School Five-Year Reunion.

2 ALUMNI NETWORK

5 FROM THE PRESIDENT

6 LEGACY NEWS

7 PROFILES

8 CAMPUS INSIDER

10 RESEARCH REVIEW

24 COMMENCEMENT

25 CLASS NOTES

34 AREA MEETINGS

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Dear Alumni and Friends,

If you have been reading the *Hardrock E-News*, you know I have been “on the road” for the Alumni Association frequently since last September—meeting and visiting with SDSM&T alumni all over the country—from Washington, DC, to the states of Washington, Arizona, Texas, and Pennsylvania! I was in Rapid City last April for “Alumni Weekend” and in May at the Fifty-Year Graduate Reunion for the Class of 1964. I want to thank the many area vice presidents and other volunteers who worked to make these events successful—you are awesome!

I am looking forward to this year’s M Day on September 20, 2014, when we will celebrate the Alumni Association’s eightieth anniversary along with Mines Musters around the globe. The All

School Five-Year Reunion is planned for July 8-12, 2015. The co-chairs of the 2015 Reunion are **Dave Berg** (ME73) and **Kirby Mellegard** (EE72). I hope you are planning to attend the reunion to reconnect with the School of Mines and your classmates.

The Alumni Association Board has been busy the past year, working on a variety of initiatives to support the Alumni Association’s mission and core focus areas. We are collaborating with the university, the Foundation, and the Hardrock Club to make several changes in the coming months. The one I am most involved with is expanding the use of the database of contact information. Our database of alumni and friends of the university allows us to regularly communicate with our alumni and friends. Select non-alumni university faculty and staff and Hardrock Club staff now have access to the online Alumni Directory that replaced the hardcopy alumni directory last printed in 2007. We are also working to improve the quality and content of the database and making the information available to help in planning events, reaching out to alumni, and supporting the mission of the School of Mines. Other initiatives will improve planning and change the way we communicate with alumni and friends.

As I prepare to leave office, I would like to thank all of you for the privilege of being your Alumni Association president this year. It has been a fun and challenging experience that I will treasure forever. In September, **Mike Alley** (GeolE73) will become the Alumni Association president for the next year. Please welcome Mike as you welcomed me, and support our efforts to provide all alumni with the opportunity to stay connected with the South Dakota School of Mines & Technology.

Go Mines!

Carmen (Pauling) Adams (ChE75)

2014 President

SDSM&T Alumni Association

Flashback

Students and professors in 1918 show off then state-of-the-art drilling equipment from the core program of mining engineering. The School of Mines was founded in 1885 to serve the growing needs of the Black Hills Gold Rush.



100 years ago

1914

Nearly twenty men turn out for the Mines baseball team. The team travels east of the Missouri to take on Dakota Wesleyan University, State College in Brookings, Yankton College, Morningside College, and State University in Vermillion. Students present a musical comedy, "The Girl in the Harem," at the Elks Opera House to help defray the baseball team's travel expenses. Ten students are awarded a Bachelor of Science degree. Students in the woodshop class put their skills to practical use constructing storage boxes for the museum, laboratory stools for mineralogy, and oak tables for the library.

75 years ago

1939

FBI Director J. Edgar Hoover notifies President Connolly that School of Mines graduate **Max E. Willard** (Geol36) has been appointed to serve as a chemist for the FBI. The Alumni Association begins a scholarship program for Mines athletes. Fifty-one men graduate, forty-eight receiving bachelor's degrees and another three master's degrees. The annual School of Mines Circus draws nearly 600 West River high school students; visitors enjoy tours and displays of campus laboratories, take advantage of the school's indoor swimming pool, and are entertained with a stage show presented by the Mines Ringmasters' Club.

50 years ago

1964

Connolly Hall receives a complete makeover. Surbeck Center completes a busy first year, with activities such as bowling and bridge tournaments, Singing Engineers, Military Ball, Honors Day, multiple meetings, and receptions. The barbershop, bowling alley, bookstore, and dining hall are busy. The newly established atmospheric research and weather modification program begins cloud seeding operations. Lt. **James Paige Wright** (EE61) becomes the college's first Vietnam casualty.

25 years ago

1989

The SKILL (Scientific Knowledge for Indian Learning and Leadership) program begins on campus, welcoming its first group of elementary students to the new summer program. At spring commencement, **Geraldine Fluke** (Phys48) becomes the first woman to receive the Guy E. March Medal. Dinosaurs come to life on campus: Animated dinosaurs, created by Dinomation, spend the summer months at the Old Gym thrilling children of all ages. Workers complete construction on the new Classroom Building.



Students from all walks of life and nationalities become one during the spring Holi celebration. With a goal to break down barriers of discrimination and foster a message of unity and brotherhood, some one hundred students and campus visitors participated in the wash of colors.



Dear Hardrocker Friends,

It's hard to believe that it's been a year since I became a Hardrocker.

I was recently in a meeting with several dozen successful entrepreneurs. Two things struck me.

First is the speed of innovation in the economy that our graduates are entering. The iPhone is only seven years old, and there are 1.2 million apps. And now the Android is outselling the iPhone five to one. The driver-less car? Probably in less than ten years. A root canal that doesn't involve a drill? Sooner than you think!

Second is the complexity of problems. Almost no engineering problem today is tackled by a single discipline. Project teams involve multiple disciplines, and the project team leader today may be the quality engineer tomorrow.

Velocity and complexity define the world of problems which our students will face after graduation, and we must do our best to prepare them for that world.

In June we unveiled our updated strategic plan—*The Pursuit of Excellence*. It is aligned with the goals the university published shortly before Dr. Wharton's death and fleshes out strategies we will pursue to strengthen this exceptional university. A few highlights:

- We will continue our planned growth to 3,000 undergraduate students.
- We will steadily grow our research portfolio in order to graduate twenty PhDs a year.
- We will continue to strengthen our engaged learning approach in the curricular and co-curricular programs.
- We will redevelop and expand needed living, learning, and research spaces.

At the core of what we do are great people—professors devoted to students. In this issue you will read how one of our professors and researchers, Dr. Charles Tolle, has taken two of our promising young students under his wing, just one example of what we already do so well and will do even better.

One of the initiatives you will hear more about is the Energy Resources Initiative, which includes a new minor in Petroleum Systems and expanded research for both the upstream and downstream oil and gas industry. With the School of Mines equidistant from three of the biggest energy-producing basins in America and our strength in core disciplines important to the energy industry, the university is poised to become a national leader in energy-related research and teaching.

Much of this momentum is enabled by graduates and friends of Mines. Alumni like **Bill Brodsky** (ME68) and **Larry Pearson** (ME72) are helping students graduate from Mines through gifts for student scholarships named in honor of former President Harvey Fraser, who had such a profound effect on them decades ago. They have issued a matching challenge to double the Fraser Scholarship fund.

We are deeply grateful to them and to so many of you, who have decided to help others gain the tools to achieve their dreams, solve problems we all face, and fill lives with purpose.

It's been a great first year, and I'm really looking forward to the next one!

Sincerely,

A handwritten signature in black ink, appearing to read 'Heather'.

Heather Wilson, DPhil
President

South Dakota School of Mines & Technology

Alumni gifts top \$1 million to honor President Harvey Fraser

The new two-court gymnasium being built at the university will be named for former School of Mines President Harvey Fraser, thanks to generous gifts from alumni and friends. “Over 300 alumni, family, and friends of Harvey Fraser have contributed to the effort, and we met our goal,” said Mines President Heather Wilson. Alumni **Bill Brodsky** (ME68) and **Larry Pearson** (ME72) helped put the effort over the top and gave Mines a new challenge: a matching program for scholarships. Brodsky and Pearson will match contributions up to \$250,000 for the Fraser Academic Scholarships and the Fraser Athletic Scholarships.

Fraser served as Mines president from 1966 to 1975. The new gymnasium, projected to open by early 2015, will be in the new 24,750-square-foot Stephen D. Newlin Family Student Wellness & Recreation Center being built adjacent to the King Center.

Gifts can be made by visiting the Foundation website at foundation.sdsmt.edu or by calling project coordinator **Larry Simonson** (EE69) at 605.394.6661 or emailing him at Larry.Simonson@sdsmt.edu.

Hardrock Extra: www.sdsmt.edu/extras

Athletics gets a new leader and new conference home



The School of Mines is starting the 2014-2015 year with a new athletics director and conference home. New AD Joel Lueken arrived on campus in June and will lead the university into full membership of the Rocky Mountain Athletic Conference (RMAC). Previously, Lueken was associate athletic director at William Jewell College. The RMAC currently competes in twenty-two NCAA Division II sports and has earned fifty-one NCAA championships and forty-two national runners-up since 1992. The university just completed its first year in NCAA Division II athletic competition.

New strategic plan to guide growth through 2022

The Pursuit of Excellence, a new strategic plan for the School of Mines, outlines six broad goals—student success, research, human resources, facilities, administration, and development—and specific strategies to accomplish each through the year 2022.

Among the highlights are aggressively increasing enrollment to 3,000 undergraduates and strengthening research by developing sustainable funding for doctoral-level studies and growing private sponsorship. Others include ambitious plans to redevelop and expand needed living and learning spaces, including a Student Innovation Center for hands-on learning and competitive engineering projects that have become a hallmark of the Mines approach to twenty-first century engineering education.

Mines launches Energy Resources Initiative

The School of Mines has embarked on an Energy Resources Initiative that will include a new minor as well as a graduate certificate in petroleum systems.

The new initiative will serve both upstream and downstream energy industries and also encompass a state-of-the-art laboratory for petrophysics/geomechanics research. The School of Mines is equidistant to three of the largest energy-producing basins in North America, including the Bakken in Williston, North Dakota. Twenty percent of graduates are already hired into the industry. Available this fall, the new minor is designed to enhance the preparation of Mines graduates for leadership in the energy industry.

For more Mines news visit news.sdsmt.edu.

A culture of giving plants seed of hope

Last October's Atlas blizzard brought three to five feet of snow and with it power outages and impassable roads for weeks. But the Mines family rallied together to help rebuild the community by lending a hand to neighbors, delivering supplies to friends, and, now, replanting some of the thousands of trees destroyed throughout the city.

Funded by donations from the city, students last spring began to fill the landscape with trees—and the community with hope. More than 150 Mines volunteers joined fifty more from city and community organizations to donate nearly 345 hours to help restore one of Rapid City's most beloved landmarks: Storybook Island. Volunteers planted trees, refurbished entrance landscaping, replaced fencing, shrubs, and plants, and cleaned debris left by the storm.

It doesn't take a record-setting blizzard to prompt the Mines community into action. That commitment to service is woven into all aspects of campus culture.

Hardrock student athletes, for example, logged a record 4,700 volunteer hours last year alone.

On August 24, Mines hopes to shatter records once again at its second annual Day of Service. Last year, more than 400 freshmen partnered with United Way to participate in clean-up, restoration, landscaping, and painting projects in neighborhoods around campus and for service organizations in the city.

“Our mission is to prepare leaders in engineering and science. ... We will serve and, through service, students will learn to lead,” says President Heather Wilson.

Metallurgy: From fun to functional

From the costumed character on the football sidelines to the old miner's face staring out from t-shirts and other School of Mines paraphernalia, the iconic Grubby is everywhere. Perhaps nowhere is he more menacing looking than as a one-inch tin figurine cast by metallurgy students.

This miniature Grubby is true to detail, from the pick axe resting over his right shoulder, scruffy beard, and M burnished on his belt buckle. He is the handiwork of recent graduate **Ian Markon** (MetE14), who estimates he has cast more than 150 one-ounce figures since he took on the senior design project two years ago.

He experimented with various tin mixtures before deciding that 92 percent tin, 6 percent antimony, and 2 percent bismuth was the perfect blend for this size and use. But casting a perfect Grubby also involves heating each crucible of the tin mixture to just the right temperature, getting the spin caster at just the right speed, and, of course, pouring the liquid, mirror-like metal with a steady hand.

Markon became interested in sculpting small figures through his involvement with Dungeons & Dragons, a fantasy role-playing game. Two years ago he was on an internship with Nucor Steel in Arkansas and decided to drive five hours one weekend to Denton, Texas, to attend the 2012 convention.

"I got to see them cast their designs, and I said, 'We can do that here at the School of Mines,' so I got some of this green stuff (a heavy wax for the mold)," says Markon, who will one day translate his passion, skills, and high expectations into the classroom as a teacher. But first he has a stop at NASA, thanks to a \$68,000 graduate fellowship, which will allow him to research whether certain inks, with their organic components, can survive in space.

For the diminutive Grubby, Markon painstakingly hand-designed the mold, starting with a tiny generic figurine. He then took a blunt scalpel and an Exacto knife to carve out the details. Several rounds of refinement and experimentation with various metals mixtures, and Markon settled on the combination that produced today's coveted Grubbys.

No two Grubbys are alike. Each individually cast and buffed by hand, a tiny tin Grubby is a valued memento, for sure, and is just one example of the wide variety of projects metallurgical engineering students are doing mostly for independent learning projects or as a creative outlet.

Some cast jewelry, fun-shaped trophies for various organizations, and other special requests from campus and community members. In February, the Blacksmithing Club sculpted steel roses as a fundraiser for Valentine's Day. Blacksmithers gather on the east side of the Mineral Industries building each Friday afternoon to forge their own brand of art.

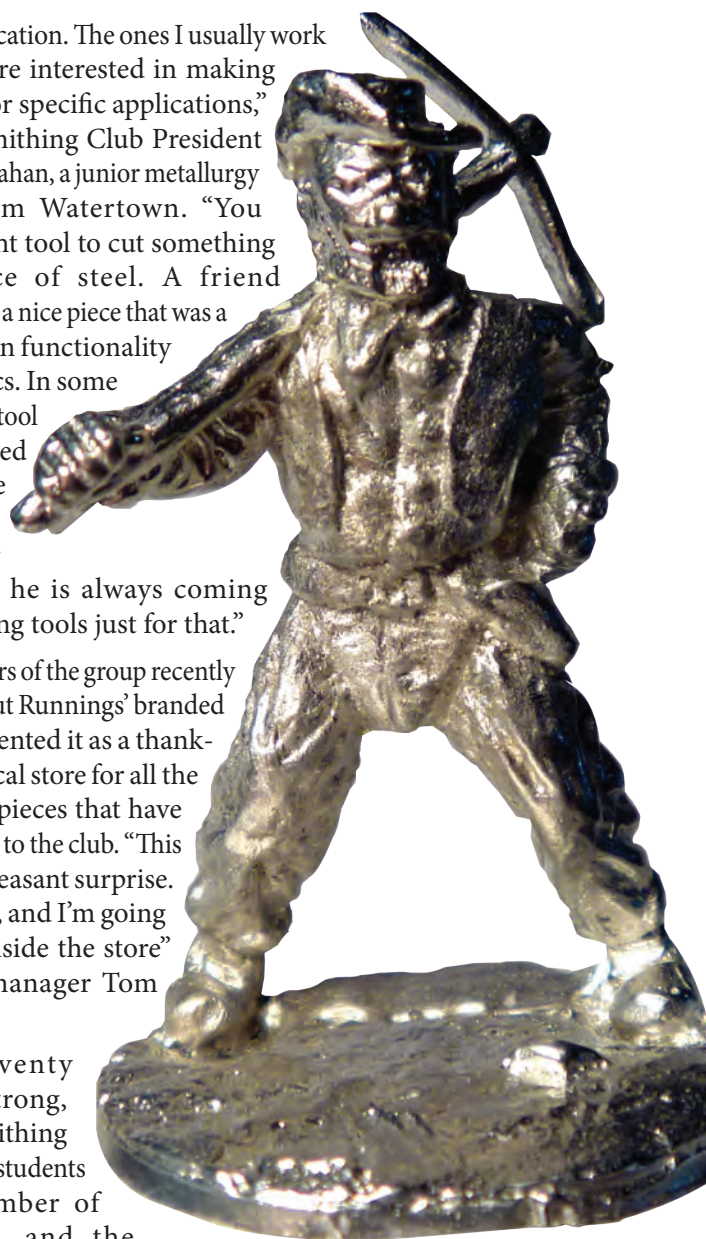
"We have a few people who consider themselves artists. But a lot of people are machinists who learn how the tools actually move and

work in application. The ones I usually work with are more interested in making their tools for specific applications," says Blacksmithing Club President Tyler McClanahan, a junior metallurgy student from Watertown. "You need the right tool to cut something like a piece of steel. A friend of mine made a nice piece that was a cross between functionality and aesthetics. In some cases, it is the tool that is a desired outcome. One of our officers is a leather worker and he is always coming in and making tools just for that."

Some members of the group recently hammered out Runnings' branded "R" and presented it as a thank-you to the local store for all the scrap metal pieces that have been donated to the club. "This was a very pleasant surprise. It's very cool, and I'm going to hang it inside the store" says local manager Tom Danson.

Nearly seventy members strong, the Blacksmithing Club attracts students from a number of disciplines, and the mechanical and metallurgical engineering students get the benefit of experiential learning about properties of the steel they are working with, which will help them in industry. "For a number of the other majors, it's about how to have that stress relief at the end of the week. Our school is known for being very difficult and so for a lot of people it's a good outlet and way to blow off steam," says McClanahan, who plans to translate his own skills someday to manufacture superconductors.

Hardrock Extra: www.sdsmt.edu/extras



Campus radio KTEQ reawakens on 93.1 FM

After fourteen years of silence and years of rebuilding, KTEQ-FM has returned to Rapid City airwaves.

Mines' campus radio has a long history, with the first station dating back to 1922 when a group of electrical engineering students established WCAT radio. The original station operated for thirty years, first airing informational programs and later popular music and basketball games before being forced off the air by a competing commercial station.

Other long-running broadcasts followed. But until last spring the station had been off the air since 2000, though it continued to stream online and over campus closed-circuit television.

KTEQ radio's programming on 93.1 FM now ranges from informational talk shows to a cappella music, with each of the twenty-five deejays creating their own unique shows and playlists. Since the station is operating under

a non-commercial educational license, it does not broadcast pop music or commercial advertisements. Station manager Brock Benson, a junior computer science major from Tracy, Minnesota, believes now that KTEQ has returned to the local airwaves, community support will quickly follow. "KTEQ was well known as a big alternative station in the past, and we hope to get back there again," he says.

In May 2011, the long road back to the airwaves resumed when an application for a non-profit radio license was accepted and the FCC granted a permit to build a new independent transmitter.

The three-year journey back required the dedication of many, including alumni supporters in industry. The Student Association Senate offered financial support for new equipment and construction of KTEQ's intermediary transmitter.

With recommendations from a consultant and alumnus **Mario Hieb** (EE82) of Phasor Physics,



Inc., in Salt Lake City, Utah, new equipment was purchased to link the Surbeck Center studio with the transmission site. Precision Mechanical and Mullenberg Electric, Inc., poured the concrete pad atop M Hill, installed the equipment enclosure, and ran electrical wiring. Experienced tower climber and alumnus **Nicholas Marnarch** (CE11) installed antennas and other equipment, along with station engineer Chris Jaques, a senior electrical engineering major from Pacific, Washington.

Despite many setbacks, support from consultants, community member and Tech Educational Radio Council Advisory Board member Gary Peterson, as well as faculty, staff, and students was key to reestablishing the station.

"We're psyched to know that the next generation of Mines radio is back in full force. Now that we are back up, we are looking for many more decades to come. I hope to be able to hear KTEQ's live programming when I return for alumni visits," Benson says.

New PhD in Civil Engineering bolsters Grad Ed

With a new set of strategies to increase research, the university is focused on graduate education, expanding both program offerings and enrollment. In 2013 a record eighteen graduates earned doctoral degrees, and the School of Mines is well on the path toward its goal of graduating twenty PhDs a year.

More than a year in the making, approval for a new civil and environmental PhD program was approved by the Board of Regents in June. Department Head Molly Gribb, PhD, said the decision to offer doctoral-level research couldn't come at a time of higher demand.

"Through the ages, it has been the civil and environmental engineers who have designed the infrastructure systems that sustain our civilization," says Gribb. "According to the American Society of Civil Engineers, the United States needs to invest \$3.6 trillion by 2020 to achieve an acceptable level of performance in these systems. As a result, highly trained civil engineers are needed now more than ever."

It's the second new PhD program offered in as many years. Last fall the highly anticipated doctoral program in physics launched with six graduate students. This fall, a dozen students will be enrolled in the program, all conducting research with world-class physicists at the Sanford Underground Research Facility in Lead, South Dakota.

Civil engineering and physics aren't the only programs expanding. About to enter its second full year, the master's degree in mining engineering offers an online distance education curriculum targeting working industry professionals seeking to strengthen their management skills. New mining department head, **Lance Roberts** (CE98), PhD, points to the need for industry leaders. "The mining sector will soon undergo significant attrition because of retirements and will need to continue to fill the talent pipeline with new graduates."

With a highly successful career as senior vice president of the engineering and consulting firm RESPEC, Roberts brings a unique perspective to equip students for management. "It is a very exciting time for the department and the university."

Partnerships fuel solutions in 3D Revolution

The world's largest supplier of jet engines, General Electric plans to produce 100,000 turbine engine parts per year by 2020 using additive manufacturing, or 3D printing, which it estimates could reduce the weight of an engine by 1,000 pounds.

Mines alumnus **Rob Mudge** (MetE76), chief executive officer of RPM, a company specializing in additive manufacturing through laser deposition, says there's just one problem: "The infrastructure isn't there. They need to find the equipment, raw materials, and people who understand the technology and know how to operate the laser systems."

Ten years ago, he wouldn't have been able to help. Today, counting Boeing as a client, he could be part of the solution—and it's all thanks to Mines.

"In March 2001, President Richard Gowen called looking for a partner in laser welding. I said great. I don't know anything about that."

The learning curve didn't take long to flatten out. Mudge and the university secured \$23 million to pursue development over the next four years.

Laser deposition works like this: a high powered laser beam is focused on a target which melts the surface of the target, generating a small melt pool. Then metal powder is injected into the melt pool and absorbed into it, creating a small weld bead. A computer program controls the tool path of the laser deposit, which can be used to repair parts or build new parts from a CAD model, layer upon layer upon layer.

When the first laser deposition machine arrived in 2004, the future looked bright, that is, until it broke. Faced with exorbitant

repair fees, Mudge turned to his staff of Mines alumni for a fix. In one year, the team took the lab from research to industrial grade, capable of working twenty-four hours per day.

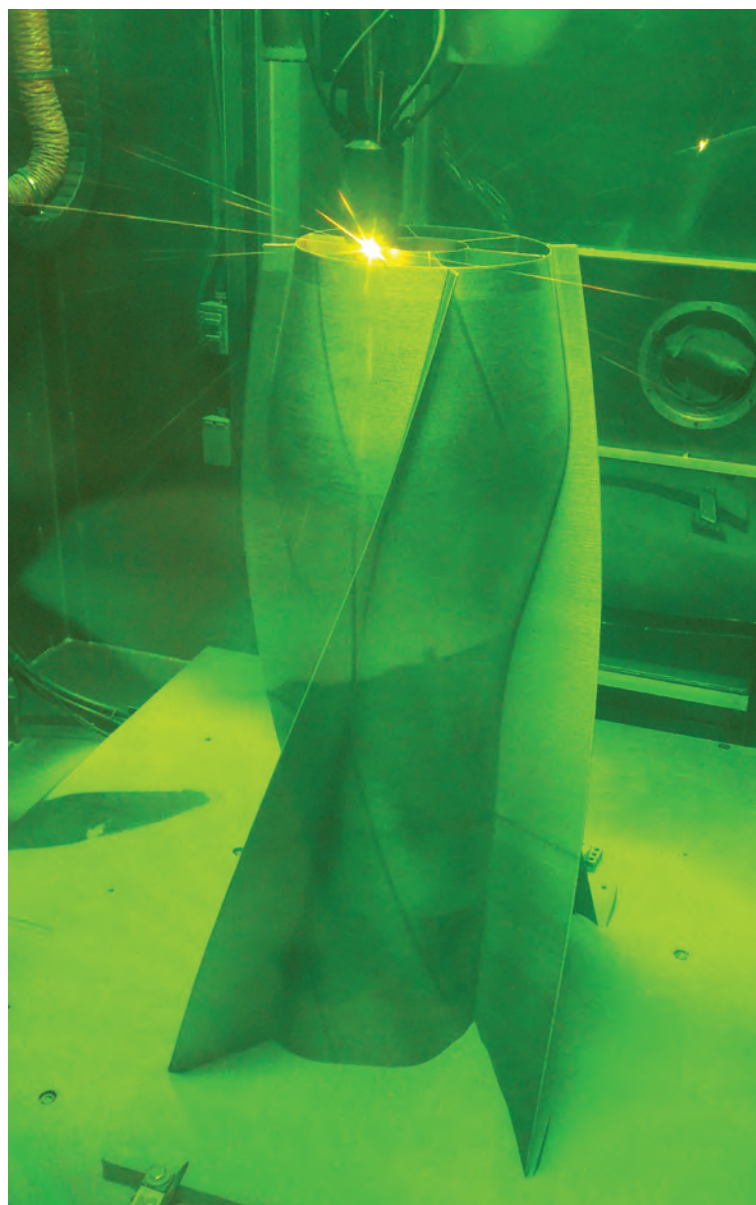
With demand for working on larger parts outpacing capacity, RPM decided to upgrade, designing and building its own stainless steel wonder with four times the work volume as the initial system. In 2013, RPM Innovations, Inc., (RPMI) was spun off of the original RPM company and now has three of these larger laser systems, allowing RPMI to repair parts ranging from a few ounces to 25,000 pounds.

Unlike 3D printing, traditional manufacturing like casting requires molds to be made first, with parts refined through trial and error, leading to heavier components, costlier changes and longer lead times.

Laser deposition allows RPMI to take a CAD file and grow one cohesive piece in a fraction of the time. "Before it would take one or two years to get a part. Now it's two to three months ... and the bottom of a part can be in the process of being deposited while the top is still being designed." If clients want a change, they simply send a new CAD file.

Mudge's 3D-printed models range from exhaust systems and heat shields to missiles, turbine engines components, and rockets. Aerospace and defense industries stand to benefit. B-1 bombers, and most aircraft, have a high heat signature, making the aircraft a target for enemies. Exhaust ducts manufactured with Laser Deposition Technology can reduce that signature to near zero, similar to the B-2.

Mines employees have also made



one of the tallest freeform laser deposits in the world. Nicknamed "The Rocket," it stands at eighty-three inches tall and is a sight to behold. Or as Mudge sees it, a sign of the times. "3D printing is going to change how things are made." He notes that China has earmarked \$100 million for additive manufacturing, South Africa, \$50 million.

With that type of explosive growth, RPM isn't resting on its laurels. Mudge will display equipment and models at shows in Europe

and Detroit, which attracts 10,000 attendees, meaning there's no shortage of opportunity in sight.

And where do future Hardrockers fit in? Mudge has a few words of advice. "Embrace this technology. It's very disruptive, which disrupts conventional thinking and processing for how you manufacture or repair a part. This is real, and the momentum is only growing." Wise words for those who'll finish writing the next chapter of an industrial revolution Mines alumni have already begun.

Sanford connection: Why Majorana matters



Decked in bright white laboratory coveralls and disposable blue booties covering her shoes, Mines' **Cabot-Ann Christofferson** (Chem97) feeds the "babies" under her care in the ultra-clean room while visitors watch through a glass window. Her face mask and safety goggles are dead giveaways: these are no ordinary babies. This is world-class science in the making, literally.

Christofferson is actually watering the purest copper specimens in the world as they grow in a sulfuric acid vat. Such pure copper is critical to the success of the Majorana Demonstrator experiment at the Sanford Underground Research Facility, in Lead, South Dakota. The experiment will look for neutrinoless double-beta decay, one of the rarest forms of radioactive decay postulated to be observed in nature. Its detection could reveal the nature of neutrinos, if they are their own antiparticle which may explain why we all exist. "They are extremely needy babies," she says of the shiny copper drums.

"We are down in the electroforming lab two to three times a week to take care of them, and the copper that comes out of this lab is the purest in the world. No other worldwide experiment is growing and machining copper in underground clean rooms, so this is a new approach. We've made huge advancements in analytical chemistry," Christofferson is a chemist who reduced her School of Mines teaching load to one class so she could serve as full-time liaison and day-to-day operations manager for the Majorana Demonstrator, which has brought together one hundred scientists from nineteen institutions throughout the world.

To produce the most reliable results, the experiment requires a radiation-free environment. Because even the detector itself must be free of radioactive particles, virtually all parts of the demonstrator are born and shaped one mile underground, likely to never see the surface of the Earth. "There is a huge movement in underground physics to hide from the cosmic

radiation that is passing through the atmosphere of the earth so we come deep underground to be isolated from that," she says.

"This is an experiment of extremes," she says, pointing out that she wears three pairs of gloves inside the electroforming laboratory. When she's not in the lab, she is in another area deep underground where the pure copper is formed into parts—hundreds of them, including spring clips, hex bolts, high-voltage rings, cryostats parts and shiny slabs of copper shielding to build the Germanium-76 detector arrays.

Since 2011 the experiment has grown 2.6 tons of copper, about 85 percent of what is needed to build the shield. In early 2015, scientists expect to begin collecting data from the experiment's Germanium-76 detectors.

"We don't understand the nature of the neutrino. Fundamental symmetries of nature would tell us that we should see equal amounts of matter and antimatter, but when we look into the universe we only

see matter. Neutrinos may offer the solution to this puzzle. That sounds crazy, and it is. But we are on the leading edge of science," says Majorana's Principal Investigator John Wilkerson of the University of North Carolina.

Three undergraduate students and one doctoral student from Mines are assisting Christofferson. While most primary tasks are done on site at Sanford, Wilkerson says work happens simultaneously at various locations.

"You have to be passionate about science and very driven to do it because it's demanding. But we are close-knit and you've got to be willing to trust your collaborators. There are lots of team interactions," Wilkerson says. "We're physicists, so we work with chemists like Cabot-Ann because we're trying to make the world's cleanest environment and materials."

Hardrock Extra: www.sdsmt.edu/extras

Microbes could hint at life on Mars and beyond

Unlike Earth, Mars lost its magnetic field 3.5 billion years ago and with it most of its shielding from energetic particle radiation. Yet the rover named Curiosity has discovered clues that the Red Planet could once have supported life.

Linda DeVeaux, PhD, thrives in this paradox. “My interest revolves around how microbes can adapt to environments where you wouldn’t think life could exist. If we understand [why], it will let us see if life can exist on other planets.”

One microbe holds promise right here at home.

Halobacterium salinarum lives in the Great Salt Lake, besieged with ultraviolet radiation. Yet its cells’ molecular mechanisms allow it to survive. Scientists had been looking for this “radiation resistance” gene for years to no avail.

DeVeaux took a different approach. Using a particle accelerator, she shot electrons at the *Halobacterium* knowing they would either mutate and survive or perish.

The results were astonishing. “They were the most radiation resistant organisms ever reported” thanks to a DNA binding protein.

DeVeaux’s work earned her acclaim and a moniker: radiation girl. That notoriety prompted a call from a former student, who was applying for a NASA grant and looking for a collaborator. If organisms were to survive the trip to Mars, they would need to handle high doses of radiation, lack of air, and the heat of reentry. In short, they would likely look a lot like *Halobacterium*.



DeVeaux agreed, and the NASA Experimental Program to Stimulate Competitive Research proposal was funded to the tune of \$749,986.

She now looks at isolates on Mars landers. “There’s a huge collection of things they sent out, and ... if we’re going to look for life on other planets, we have to make sure we didn’t bring it” aboard the rover. Poring through hundreds of microbes, DeVeaux tests each one. To date, NASA’s Jet Propulsion Laboratory housing the samples has archived 2,500 isolates from the 1970s, which may seem an overwhelming amount of data—to most.

But DeVeaux is driven by a thirst for knowledge. “I like having unanswered questions. As a scientist, you need to bring forth new knowledge.” And maybe in time, new life.

Bridging the gap from idea to life-saving science

In 1969, Apollo 11 put two men on the moon, a mission requiring the most sophisticated programs ever written. Today, a single iPhone holds more computing power.

Now, technology’s next revolution is at hand: quantum computing. Though currently on the market as D-Wave machines, the technology remains nascent, but Andre Petukhov’s research is bringing physicists one step closer to the Holy Grail.

“One of our goals is to study the magnetic properties of quantum dots ‘doped’ or implanted with magnetic ions like manganese to make these artificial atoms magnetic,” ultimately for use in quantum computing, says Petukhov, PhD, professor and

head of the physics department.

In essence, quantum computing is far faster than traditional computing because particles can be in multiple states simultaneously. It not only uses the zeroes and ones of traditional computing, but the superpositions of those numbers, as well, to determine optimum outcomes among nearly infinite possibilities, solving problems exponentially faster than can be done today.

Quantum computing also profits from entanglement, a correlation between particles so strong that they can move in perfect tandem even if placed at opposite ends of the universe. One particle stores information about the other housed kilometers away. The two particles

have to be brought together to unlock the cipher—a nearly impossible feat.

In short, it’s the key to creating unbreakable code.

Quantum computing also allows for the factoring of huge numbers, crucial for public-key cryptosystems used to protect financial transactions and accounts.

For Petukhov, in the end, it’s not about crunching numbers, but saving lives.

“You can use these magnetic quantum dots in medical fields. For instance, by applying a magnetic field, you can heat them up remotely without any contact.” And, theoretically, when

you deliver the quantum dot to a cancer cell and remotely heat it, the cell dies—eradicating tumors without ever touching the body.

Still in the pure research stage, Petukhov hopes to bridge the gap from ideas to implementation and transform tomorrow’s science fiction into today’s science fact.

Bright Young Minds

FOSTERED THROUGH MENTORING

“It’s like a vending machine for data!” an excited Adrian Del Grosso says upon opening a nearly seven-foot tall metal box, exposing rows upon rows of slots where data-weighted tape will be stored. Del Grosso and fellow student Conrad Farnsworth had just unloaded the 1,400-pound HP machine in the basement of the Electrical Engineering and Physics Building after towing it five hours through a thunderstorm from Shepherd, Montana. A steal on E-bay for \$500, and purchased with their own money, the enterprising young engineers plan to jury-rig the library as a hard drive to store data from computational mathematics and eventually donate the HP contraption to the university.

“This is just a little side project for now. This holds like 120 terabytes of space. It’s going to be awesome. The university is letting us keep it here since we decided to give it to them when we are finished with our experiment,” says Del Grosso, of Huron, South Dakota, his youthful dialect at times betraying his brilliance.

A side project, indeed. It’s just one of “about four irons in the fire” for Farnsworth, who, as a Newcastle, Wyoming, teenager last year, became among a handful of people in the world to have achieved nuclear fusion—with a reactor he built for a high school project in his parent’s garage. Farnsworth participated in too many fairs as a high school senior, unbeknownst to him, and was famously disqualified from the Wyoming State Science Fair, subsequently attracting international media attention.

Farnsworth, an electrical engineering major, and Del Grosso, a computer engineering major, met last summer while working at the Sanford Underground Research Facility just before enrolling at the School of Mines as freshmen. Del Grosso was at Sanford with the Davis-Bahcall Scholar physics program, while Farnsworth describes himself more as having “bullied” his way in for a “free internship.” While they admit their brief project last summer was a “disaster,” they agreed “that’s how we learn, by failure.”

At the top of their graduating classes and hardwired with an inherent drive to discover and achieve, they represent a classic example of the limitless possibilities that can be fostered through mentorship. The School of Mines’ new strategic plan calls for developing a stronger advising and counseling program to more closely mentor students, particularly freshmen.

A new study of more than 30,000 college graduates across the

country reinforces what seems obvious—a supportive professor is key in a student’s well-being after college. The 2014 Gallup-Purdue Index Report, in a study supported by Lumina, shows that students who connect with professors who stimulate and encourage them are twice as likely to be engaged in their post-college work and three times as likely to be thriving in their overall well-being.

For now, Farnsworth’s and Del Grosso’s enthusiasm for discovery is guided by Charles Tolle, PhD, associate professor in the Department of Electrical & Computer Engineering, who recognized something special in them early in their freshman year. He is employing them full-time this summer through a \$450,000 grant by the Office of Naval Research Center as research assistants to help study system identification through non-linear differential equations.

Fundamentally mathematics research, the ultimate goal of system identification is to develop models that make any kind of dynamical system work. “Right now I’m using math equations to try to figure out how to get this pendulum to swing for Dr. Tolle,” Del Grosso says. “It’s satisfying to see a little progress made every day. I love it.”

Tolle, who arrived at the School of Mines in 2009 from the Department of Energy’s Idaho National Laboratory, is a firm believer in mentoring. Ideally, he believes, companies should pluck the most promising students as freshman and bring them aboard for grooming each summer before hiring them full-time upon graduation.

“The world has always worked off mentors. What does it mean to be a journeyman, an apprentice? Almost nothing is completely written down. You always leave stuff out, and the mentoring process is about filling in those gaps. It’s interactive, and you learn faster,” says Tolle. One of the reasons he came to the School of Mines is its unique multi-disciplinary approach to teaching and solid reputation as a place where students routinely help solve real-world problems in hands-on projects with peers from a variety of engineering majors.

“Here are students who have something interesting and different and need a mentor. What can they become? They have the potential of becoming world-class researchers if we take the time to mentor them,” says Tolle, who also mentored visiting student researchers at the national laboratory, where he served as a group leader and continues to contribute as a senior researcher for its Instrumentation, Control and Intelligent Systems (ICIS) program. He is part of the ICIS team that was recently recognized by the Institute of Electrical

and Electronics Engineers for its efforts to address national and homeland security needs.

As Farnsworth is learning, achieving success takes a little more discipline than the fictional secret agent troubleshooting MacGyver approach. “You learn a lot about the thoroughness of work,” Farnsworth agrees. “Just yesterday we sat down and ended up talking for two or three hours about data keeping.”

“Dr. Tolle is down in his office right now writing papers while we are working on things here in the lab. But he comes in a lot and we sit down and just talk about the problems we are encountering and where to go from here. It takes a lot of time on his part, and there is a certain amount of effort to be expended,” Farnsworth says.

While these students’ idea of fun might be called work to someone else, they do have a few non-academic interests, too. Farnsworth is president of the Newman Club and faithfully, even on the most bitter Wednesday last winter offered, leads the weekly rosary walk around campus. DeGrosso is a licensed pilot who, nearly three years ago as a high school junior, flew a plane solo to Rapid City for his first visit to the Mines campus.

For all the obvious benefits of mentoring, such as importance of meticulous record keeping in research and applying the scientific and engineering principles to a specific task, there are seemingly countless intangibles, such as emotional support and encouragement gleaned from a mentor.

“He has a lot of insight and knowledge on so many topics,” Del Grosso says in awe when speaking of Tolle. “We’ve already learned so much in the past year. It’s crazy.”

“For me, no matter what happens with this systems identification research for the Navy, I’m planning on working with him on a bunch of my personal projects,” says Farnsworth, adding, “I would have gone mad had I not had these kinds of projects to be working on. I never envisioned myself simply going to class and studying in a library without being involved in research projects.”

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Adrian Del Grosso, left, and Conrad Farnsworth, right, have been under the tutelage of Charles Tolle, PhD, for the past year.

CHANGING the Narrative

Mines researchers apply security printing, anti-counterfeiting tools to authenticate artifacts, prevent Native American art forgeries

From Europe to the Far East, a slew of records document the march of metal into the Iron Age. But there's a continent missing from the story, a civilization on the northern plains that suddenly switched from stone arrowheads to metal tools—in complete isolation. And historians have no idea why.

Metallurgical engineering professors **Grant Crawford** (MetE04), PhD, and **Jon Kellar** (MetE84), PhD, are determined to discover more about a culture under wraps, unearthing secrets of the Native American past and changing the narrative of a nation.

They began two years ago with a proposal to establish a brand new Research Experience for Undergraduates (REU) site at the South Dakota School of Mines & Technology funded by the National Science Foundation. Its focus: advancing security printing and anti-counterfeiting technology to make forgery a nearly impossible crime. With Mines mere hours from the Pine Ridge Reservation, authentication of Native American artifacts was to be a key tenet of the research.

One year later, during the inaugural REU site, sophomore Domingo Tamayo picked up a calico pouch whose contents remained shrouded for more than a hundred years. Even the slightest misstep risked destroying the artifact, its history disintegrating to dust. But Tamayo had a tool to unravel mystery and document a forgotten past closely entwined with his own.

The physics major had joined an elite group of students from across the country for the REU program hosted at Mines. Partnering with The Heritage Center at Red Cloud Indian School, Tamayo set on a trek to preserve the past through today's high-tech tools.

From conversations with elders and resource consultants Jhon Duane Goes In Center and James Rattling Leaf, Sr., Tamayo knew the artifact was an attachment to a bustle, a bundle of

feathers given for war deeds and acts of bravery. Each item placed in the medicine pouch held special significance in the life of the owner, and no person apart from the owner was allowed to look inside. Out of respect, Tamayo refused to open the pouch. His curiosity for its hidden contents, however, remained unquenched.

So he began testing, first with an x-ray fluorescence analyzer, the gold standard in element detection. Scans of the pouch measured huge spikes in copper. Shrapnel was a possibility, though with such a soft metal, unlikely. Puzzled, Tamayo placed the pouch in a Micro CT scanner, a machine capable of 3D x-ray imaging.

With a click, a multicolored image appeared on the screen, a mesmerizing sphere of hot pink hues, vivid blues, and fiery orange-yellows. Suddenly, Tamayo realized he was looking at two metal rings. Then another image emerged, a bundle of strands curved along the vessel's interior. "We think it's a plant, possibly sage. But we're not sure. It's too thick to be human hair," Tamayo said, eager to learn more.

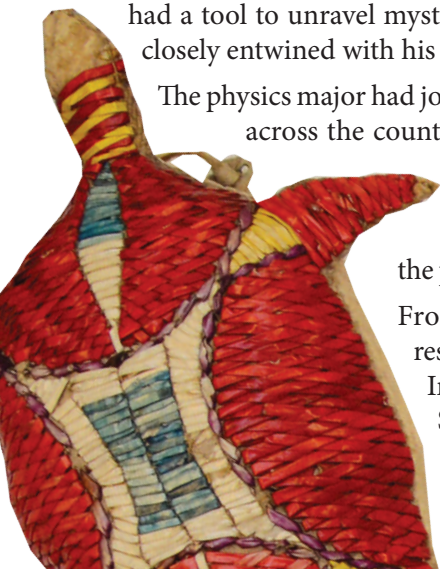
"I took for granted that these traditions were just the way things were, but now I see the links."

For that, he would turn to an unlikely source.

Born and raised on the Rosebud Reservation, from a tender age Tamayo was steeped in history. His father, an instructor of Lakota arts at Sinte Gleska University, worked as a cultural consultant for the Smithsonian. He told Tamayo the pouch's cloth came from Europe, its calico a hallmark of the continent. But its genesis in the Western world hinted at a saga far more nuanced than a geographic origin.

Less than a decade before the Civil War, Congress passed the Indian Appropriations Act, authorizing the creation of reservations. By the late 1860s, President Ulysses S. Grant's "Peace Policy" was in full swing, relocating tribes from their ancestral homes to dedicated parcels of land, replacing government officials with religious men charged with teaching Christianity to the tribes.

For Mary Bordeaux, former curator and interim director of The Heritage Center, this moment of illuminated history was, in a word, magical. "The pouch was not something I would have looked into,





On their way to select artifacts for further research, Domingo Tamayo, Grant Crawford, Jeremiah Richards, and James Rattling Leaf pause before the sweeping vista offered by the Badlands on the Pine Ridge Reservation.



because as a museum person, there's no reason to. But through non-invasive techniques, we get this amazing x-ray. ... Why were these copper rings used? Now, there's a possibility of further research."

But authenticating the artifact was only half the boon. "When you're researching academically in the Western world, all your resources come from books, where everything is already written. It's important for researchers to contact Native American elders because we have an oral tradition," she says. "And when this oral tradition is integrated into the Western world, it validates that information. Scientific research is very fact-based in Western thought and philosophy. [Through this research] he's authenticating what elders have to say."

Tamayo says the same is true of Native American tradition, noting that the scientific method used to describe the world was practiced on the plains long before laboratories appeared, as the cornerstone to survival in a nomadic culture. He points out the design of tipis was not the product of an epiphany but of trial and error. Tipis sport two layers, an inner lining attached to the ground and an outer cloth elevated about six inches above—a design used to create a draft and force smoke through the top, while acting as insulation from the snow. The front of a tipi always faces east as a spiritual greeting to the morning sun with the practical benefit of mitigating the impact of north and west winds.

"I took for granted that these traditions were just the way things were, but now I see the links," Tamayo acknowledges with a grin.

Forming that connection between two worlds is critical, Bordeaux adds, explaining that for Lakota people, learning is cyclical. A simple study of moccasins, for example, can spark a discussion on construction, color theory, design, plants, or animals. "By bringing science into an art museum, a Lakota museum, it shows these things are all connected to each other."

This summer, Tamayo and civil engineering sophomore Jeremiah Richards, along with Crawford and Kellar, are looking to authenticate or security print on contemporary Native American art to show proof of concept.

Before the 1990s, counterfeit Native American goods were a booming business, devastating local artisan economies dependent upon sales. The high profit margin and easy marketability of these crafts prompted opportunistic businesses to ship production to China, selling mass-produced beaded belts, among other goods, as authentically crafted—and cheap, \$5 to the \$50 charged by reservation artists.

False advertising became so rampant that Congress passed the Indian Arts and Crafts Act, a truth-in-advertising law that prohibits misrepresentation in marketing of Indian arts and crafts within the United States. Penalties are stiff, and enforcement relies on the artist proffering a certificate proclaiming American Indian heritage and tribal affiliation.

Despite these safeguards, both Bordeaux and Tamayo say theft still happens, and disputes over ownership are nearly impossible to arbitrate, as it's often one person's word against another. For The

Heritage Center, the only means of resolving a dispute is to identify an artist's work based on design and colors used.

This loss can be devastating, as heirlooms are passed through generations, or dangerous, possession of an eagle feather is illegal unless properly documented as a historical item.

Until now, the problem seemed unsolvable. With their modern technology tool kit, Crawford, Kellar, and Tamayo present a unique solution, printing on artifacts with artists' information or historical documentation using ink invisible in ambient lighting but readable with a near infrared laser. An ingenious solution, security printing solves questions of origin without damaging the integrity of a piece.

It also offers an economic stimulus, critical in a place where nearly half the residents live below the poverty line. Citing a recent Rapid City study conducted by the First People's Funds, Bordeaux ticks off a series of startling statistics that underscore the impact of art in Native American communities on the Pine Ridge and Cheyenne River reservations.

- 30 percent of the population are artists, most below the poverty line
- 51 percent of households run a cash-based business out of their home
- 79 percent of those businesses produce traditional arts and crafts, including bead, leatherwork, and tipi art

Current interim director and curator Mary Maxon says The Heritage Center buys local art produced outright from the artist, eschewing commission to keep costs low to visitors and profits high to makers. With a markup of 33 percent of a product's value, enough to keep the lights on and staff paid, the center has supported local artists to the tune of \$90,000 to \$100,000 annually, pumping much-needed income back into the community.

Mines' efforts are spreading like wildfire. Tamayo has presented all over the country, at the American Indian Science and Engineering Society's national and regional conferences and at George Washington University in Washington, DC, by special invitation from its Native American Student Association. He speaks not only on the methods and technology used to authenticate Native American artifacts, but on the importance of preserving cultural integrity and history, and finds in the process his appreciation of his own heritage deepens.

A century-old mystery finds its final destination in Tamayo's hands. And as Tamayo uncovers another's forgotten legacy, he rediscovers his own, forging a bright future for his people among luminaries of the past.

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Forty years later, Doug Schlepp still treasures the game ball from his record-setting night on the Hardrocker basketball court.

Groomed for GREATNESS

Locker room to office: Hardrocker athletes are captains in all life's arenas

Before **Doug Schlepp** (Met74) seized the reins at one of the top mineral processing equipment companies in the global mining industry, he slayed basketball records at the School of Mines.

Inducted into the Hardrocker Hall of Fame in 2004, Schlepp still holds Mines' record for All-Time Scoring Leader in men's basketball, with a career high of 2,440. He is also credited in Hardrocker annals with making 617 of 969 free-throws.

After leaving the School of Mines, Schlepp cut his teeth in industry toiling in Krebs Engineers' laboratories before rising to the rank of president, CEO, and chairman of the board in 1994. He organized the 2006 sale of Krebs to GLV, which in 2007 became part of FLSmidth Group, a large Danish company. Krebs is now a major processing equipment company with the FLSmidth Mineral Processing Group. Schlepp credits leadership skills honed through hard work on the courts and in classrooms at Mines for helping him achieve such career pinnacles.

"Businesses are teams, really. Just like in sports, your role on the team is one of inspiring and participating and pushing and challenging others, as well as yourself, and expecting just as much of them as you would of yourself," says Schlepp, who led the Hardrocker basketball team as captain his junior and senior years. "Whether it is leading a team or running a business or even a department within the business, all the principles are still there." Schlepp, a Tucson, Arizona, resident, retired from FLSmidth this summer.

This Hall of Famer's court accomplishments are legendary, but Schlepp is by no means the only former Hardrocker standout who went on to become a captain of industry.

Randy Baker (MineE86) threw the discus in track and field events and played nose guard on the O'Harra gridiron before eventually becoming president of P&H Mining, a Milwaukee, Wisconsin-

based company that supplies 90 percent of the world's mines with specialized shovels, draglines, and other drilling equipment. **Bill Brodsky** (ME68) led the Hardrocker football team as quarterback before eventually becoming president of Washington Transportation Group in Missoula, Montana.

Baker and Brodsky are just a couple examples of those who possess the magical combination of athletic talent and technical skills and who have the inner drive that takes one from the training rooms and playing fields to the board rooms of industry. Former football player **Shane Durgin** (MineE86) is president and general manager of Alpha Coal West in Gillette, Wyoming, which operates two Powder River Basin coal mines; former track star **Marty Jackley** (EE92) is at the top of his field as South Dakota Attorney General; and former Hardrocker **Tony Jensen** (MineE84) is president and CEO of Royal Gold in Denver, Colorado. To name just a few.

Baker came to know the School of Mines from his father's connection with **Bruce Sabacky** (MetE73), an outstanding cross country runner and distance runner for the track team, who is now the CTO for Altairnano Inc. in Reno, Nevada.

Baker admits he wasn't "burning up the charts" with his grades but he worked hard and earned four summer internships with the US Geological Survey. He started his career as an engineer and within five years was transitioning toward the management side of industry, running products and learning how a company makes money. He was vice president of a division by the time he was thirty-five. By forty he assumed the role of division general manager.

He credits his success with the broad educational experience offered at Mines and being part of a team both on and off the field. "We were very good, division champions for three years in a row in the 1980s so you were around a lot of driven and outgoing people anyway. In business, you can be great at your specific job but if you



Clockwise, beginning with top left: Now South Dakota's attorney general, Marty Jackley helped lead the 1990 men's cross country team to a District 12 championship. Bruce Sabacky goes the distance as a cross country runner in 1971. By 1972 Doug Schlepp was well on his way to shattering a multitude of Hardrock basketball records. Tony Jensen, Randy Baker, and Shane Durgin were among the many standouts of the 1982 football team. Quarterback Bill Brodsky engineered all of the Hardrock scoring in a heartbreaking 26-25 M Day loss to the Northern Wolves in 1967.

can't stand up and sell your product, you're not going anywhere," Baker explains. "If you look at the list of Mines alumni who run companies, a lot of them were athletes. Athletics teaches you how to win, and running a successful business means that you've got to learn how to win. You certainly have a competitive nature and to me that's the important thing. It starts at a young age. Students are coming to the School of Mines because they want to be an engineer or scientist and are coming in very focused already."

Baker counts former head football coach Gary Boner and mining professor Dr. Zbigniew (Ziggy) Hladysz, who retired just last year, as his mentors at Mines. "Dr. Ziggy was very patient with kids and a great professor. I'd ask him career things, like what companies I should be thinking about, and he helped me with references when I graduated," says Baker who is now paying it forward as a member of the Department of Mining's Industrial Advisory Board.

Juggling academic commitments with athletics and other endeavors demands a keen sense of discipline and time-management skills. "It's a tough balance, especially at Mines where it is very rigorous. If you don't manage your time well, you're just not going to make it," Baker says. "Sometimes you learn the hard way to manage your time and study on the road. But it is easier said than done, studying first and playing second."

Schlepp remembers "coming in at 2 a.m. on a Sunday from an away game and still having to be at the 7 a.m. calculus class the next morning. But it was just what had to be done, and we didn't think twice about it." Schlepp, like many other standout student athletes, also participated in or assumed leadership roles in other organizations. Schlepp served as president of the Triangle Fraternity and briefly participated in track as a triple jumper.

Baker's advice to current and future students? "Anything worth having is typically tough, but it's worth it in the end."

Brodsky, who served in Vietnam after earning his undergraduate degree at Mines, has spent his career in the railroad industry. After returning from Vietnam he was hired by Milwaukee Railroad. He later worked for the Santa Fe Railway in Chicago and ultimately worked for the Washington Companies in Missoula, Montana. Early on in his career he began to move up the ladder and simultaneously earned an MBA from the University of Chicago while continuing to work. Today, he remains on the railroad boards of Washington and offers consulting expertise.

A natural-born leader, Brodsky initially played intramural football as a young freshman at Mines and was discovered by one of the football coaches who strongly suggested he "get down to the field tonight; we want to talk with you. ... I think I actually ended up being the quarterback in the fourth quarter of the game that night."

He recalls enjoying college life a little too much, to the chagrin of former university president and war hero Harvey Fraser.

Coming from a rural farming area, Brodsky had already learned the value of hard work at a young age. Much like any great athletic coach, Fraser, he says, had a tremendous ability to motivate. "He

kind of took a shining to me, and my academic work wasn't going too well at the time. One night after practice he called me down and we had a very long conversation that totally turned my life around. He asked me what I was going to do with the rest of my life because at the rate I was going I wasn't going to be an engineer."

Perhaps motivated to succeed in business by that pep talk some 50 years earlier, Brodsky recently honored Fraser's memory with a major gift to name for him the new two-court gymnasium in the Stephen D. Newlin Family Student Wellness & Recreation Center currently under construction.

Jackley, too, credits much of his current success to lessons learned at Mines. "The School of Mines and our coaches instilled the work ethic and confidence that made my career opportunities happen."

Brodsky correlates success in business to success on the football field. It takes a team effort. "I believe businesses function as a team. You win or lose as a team. You may have an awful good player but if the team loses the game everybody loses, and conversely everybody wins. I have found most people want to be a part of the team."

Like Brodsky, alumni **Joe Lambert** (MinE86) and **Ronald Van Horssen** (ChemE73) played intramural sports and participated in other leadership activities throughout their college careers before ascending in industry.

Lambert is chief operating officer of North American Construction Group, based in Edmonton, Alberta, Canada. Van Horssen is chairman of The Cottonwood Group and previously headed Mobile Technology, Inc., the nation's leading diagnostic imaging and shared services company, and in 1989 was named *Inc.* magazine's Entrepreneur of the Year.

Lambert's team won the intramural football championship; and he was also a member of the Mines Mining and Mucking Team, which traveled for competition. Lambert says he is amazed at the number of Mines graduates who are industry leaders. "The mining industry is extremely small, but it's international, too, and it's amazing to me how many alumni I run into. When you go out and find 30 percent of your class are senior executives in mining companies it's pretty impressive. To me, nothing demonstrates the success of an educational institution better than the success of past students."

Van Horssen was president of the intramural judo club, training regularly and participating in tournaments. He also exhibited leadership by starting the university Jazz Band as a saxophonist. He got on the management track early on in his career. "Being involved in activities, along with the rigor of the education, helps to build a great set of characteristics that provide the foundation for successful career," he says.

Lambert is a big believer in leading by example. "Leadership means a lot of different things to a lot of different people. I have a pretty simplistic view of leadership: Demonstrate the things you want to see in others. It's pretty tough to ask of people if you don't see it yourself," Lambert says.

80 Years Young:

Dedicated alumni keep the Mines family atmosphere alive decades later

As the Alumni Association celebrates its eightieth anniversary this year, it looks back on the crisp October day when it all began.

Deep in the Depression-era, an idea was brewing. M Day was just around the corner, recalling fond memories but leaving alumni, like 1922 graduate and math faculty member **Guy March** (EE22), wondering where their classmates were now. So he called a meeting, proposing a new organization be chartered to keep alumni in touch with each other and the school.

On October 5, 1934, the Alumni Association was founded under the leadership of March, who would become its patriarch and a father figure to generations of Hardrockers. Shortly thereafter, the association undertook its first project, O’Harra Field, and produced the inaugural issue of *The Hardrock*, a slim black and white volume on newsprint featuring events and alumni news.

Halfway around the world, a different beginning loomed. Two months prior, Adolf Hitler had been named Führer, and the inklings of war cast a dark shadow on the horizon. The draft would take sons, fathers, brothers, and friends to the trenches—and alumnus **Perry Goth** (ChE44) from the Black Hills he loved to the seas of the South Pacific.

Through the fog of war, one beacon shone bright: a handwritten correspondence with March that would span more than forty years. It was March to whom Goth would tell of his engagement and trace his meteoric rise through Phillips Petroleum. Goth and his brother **Jack** (MetE50) both later served as Alumni Association president, and they rarely missed a five-year reunion.

That kind of enduring bond was a hallmark of the March era and holds true for the modern Alumni Association, which boasts boxes upon boxes of letters, newspaper clippings, baby announcements, and career accolades. A veritable opus, these records, along with an alumni database, trace the arc of history from the 1930s to today.

“We’re an organization based on camaraderie. The Alumni Association gives people a way to stay engaged and give back,” explained current Alumni Director **Tim Vottero** (Chem84).

That ethos emerged often throughout the association’s storied past.

Following the Allied victory, Mines launched its first All-School Reunion in 1946 as a homecoming for Hardrocker veterans, honoring their service and sacrifice. The barbeque attracted nearly 750 people, many of whom, like Goth, had kept in touch with March during their military service in Europe, China, and beyond. The tradition carries on to the present. Next year, alumni spanning seven decades will return to campus for the five-year reunion once again (July 8-12, 2015).

Nearly a decade after the war, alumni answered a different call, one sounded by their future members: Mines students.

In 1953, Connolly Hall stood empty. The state lacked the funds needed to furnish the residence. So the Alumni Association took action, raising nearly \$30,000 to purchase furniture, a generous act of philanthropy, but hardly the first. Under March’s leadership, the Endowment Association was chartered in 1954. Until the SDSM&T Foundation’s re-incorporation in 1981, the association served as the main fundraising arm for the university.

Student service would remain a cornerstone of the association’s endeavors, perhaps most memorably with the dedication of the Surbeck Center in 1963. Before this time, the student center and bookstore were stashed in the basement of Connolly, crowded among ping pong tables and food service.

March recognized the need for a student gathering place, leading the charge for a new center with committee chairs **Jim Bump** (MetE29) and **William Coyle** (CE44). Mocking up initial drawings in 1959, March set a goal for alumni to fund 65 percent of the costs. Students voted to pay each quarter toward the center, eventually giving \$217,000. Faculty, fraternities, the Mines Endowment Association, and a loan from the Housing and Home Finance Agency raised the remaining capital. Today, the Surbeck Center is a hub of campus life, housing student activities, dining, multicultural and veterans’ affairs, among a host of other campus events and offerings.

Two decades later, the Alumni Association began recognizing its own, beginning in 1975 with the Guy E. March Medal, followed by the Outstanding Recent Graduates awards and the Distinguished Alumni awards. A testament to his lifelong devotion to Mines, Goth was named the 2001 March Medalist.

Over the years, the association has seen its share of change. Vottero recalls the transition from inscribing alumni records on paper cards to magnetic tape to its current database. He reminisces upon a time when the association would print out the ten emails it received each week and handwrite a response. "Now I receive a hundred emails a day," he said bemused, and reach thousands of alumni each week through *Hardrock E-News*.

Yet even with the advent of technology, some things haven't changed. And he hopes some things never will.

"This is a wonderful story about timelessness. Alumni always have a story about some professor or some M-Day, whether it's 2014 or 1934," Vottero said.

Current Alumni President **Carmen Adams** (ChE75) also added, "As I look back on the more than 700 alumni, families, and friends I have met at alumni events during the past, I marvel at the wide variety of paths our alumni have traveled during their careers, while keeping and growing their connection to Mines and to each other. On this eightieth anniversary of the Alumni Association, which includes all graduates of the School of Mines, we are proud to be the 'Keepers of the Traditions' for the last eighty years and the next eighty years."



Monte S. Dirks honored as 2014 March Medalist



Monte S. Dirks, (MetE74) MD, received the Guy E. March Medal at the 2014 spring commencement, which featured Peabody Energy COO and President Glenn Kellow as the keynote speaker. Nearly 300 Doctor of Philosophy, Master of Science, Bachelor of Science, and Associate of Arts degrees were awarded to students at the university's 169th commencement ceremony. Nearly forty alumni attended to celebrate their fiftieth graduation anniversary.

Dirks is chairman of Black Hills Regional Eye Institute (BHREI) in Rapid City. As a Mines student, he was an active member of Triangle Fraternity. In 1984, Dirks received a Doctor of Medicine degree from the Uniformed Services University of Health Services in Bethesda, Maryland. In 1999, he retired from the Army Medical Corps with the rank of Lieutenant Colonel and joined the Black Hills Eye Institute.

Born in Canton and raised in Harrisburg, South Dakota, Dirks is a long-time member of the Hardrock Club, which financially supports student athletics. Dirks and his wife, Luanne, support the cheerleading squad and its many activities and have also established two scholarship funds for undergraduates. The Hardrock Doc Scholarship provides funds for an undergraduate with a pre-health sciences major. The Harrisburg Hardrocker scholarship funds undergraduates from Harrisburg High School, his alma mater.

Dirks has been a remarkable contributor to the Mines community



and to Rapid City. From 2003-2010, he served as chair of the campus Greek Advisory Board by request of the Office of the Dean of Students. He is an active member and leader in several organizations, including Triangle Fraternity alumni trustee and president, and was named one of the one hundred "Triangle Fraternity Men of the Century" in 2007. The BHREI, under his leadership, has been an annual supporter of the Mines Medal event.

In his second term as a trustee of the SDSM&T Foundation, Dirks is also a Lifetime Contributor to the Alumni Association and served as co-chair of the 2010 All School Reunion. In 2008, he was a recipient of the Distinguished Alumni Award.

1940s

Bettie England (Ex46) is eighty-eight and everything is A-OK. She is planning her ninetieth birthday bash, which will include dancing on the table!

Douglas Fuerstenau (MetE49), Professor Emeritus of Mineral Engineering at the University of California, Berkeley, was honored at the 2014 Annual Meeting of the Society for Mining, Metallurgy and Exploration (SME) in Salt Lake City. SME and the International Mineral Processing Council (IMPC) presented Fuerstenau with an IMPC / SME Special Award for “outstanding contributions to the global mineral processing community through teaching, research, and professional service.” In addition, two special technical sessions at the meeting were designated as Fundamental and Applied Advances in Mineral Processing: A SME/IMPC Tribute to him. Fifteen invited papers were presented at these sessions. Also at the SME Annual Meeting, he and Dr. Pradip, former Berkeley graduate student and now vice president, Tata Consultancy Services, Pune, India, were recipients of the 2014 SME Arthur F. Taggart Award for their paper, “Design and development of novel flotation reagents for the beneficiation of Mountain Pass rare earth ore.” The

Taggart Award is given annually by SME for a paper, or series of papers, which represent a notable contribution to the science of mineral processing.

Jim Ward (EE49) has enjoyed retirement for twenty-six years and tries to stay active and healthy. He climbed M Hill last summer with his son, Rich, and his two youngest grandsons. It was his first experience up the new front route. He claims it is much easier. The two grandsons are looking forward to having their names up there one day.

MEMORIALS

Donald A. Dittman (ChE42)

William Nielsen (Ex45)

Wilfred J. Schroeder (CE49)

Norbert F. Vinatieri (MetE43)

Robert L. Zimmerman (Phys48)

1950s

Fred Bob Annett (ME56) had a great visit with Pati and **Dave Seefeldt** (GeolE58) a few months ago. He was very impressed by the new SDSM&T dorms, since his last trip in 2010. He noticed that Rapid City is growing and prospering, as well.

Ernest Baresch (EE59) retired from Boeing in July 1995 and moved to Lincoln, Nebraska. He married Elaine in early 2009. He reports that their health is good.

Dale Bridenbaugh (ME53) is well, except they need rain in California.

Jay Brink (EE56) arrived in Arizona in December where he and Betty remained until April. They enjoyed the warm weather. He is still recouping from radiation but has improved, and Betty is doing well.

Jim Brooks (Geol56) is giving tours at the Quincy Mines during the summer. It keeps him busy even though there are not many people around anymore that know much about steam engines.

Janell Christmann sent a note about the passing of **Marv Christmann** (Phys56). “Marv passed on March 17 after three months of struggling with pancreatic cancer. He was so brave and courageous, thinking his glass was ‘half full’ until the end, which was true to his positive outlook on life. He was diagnosed on December 12. We had a beautiful service for him at our church in Green Valley, with over ninety friends attending.”

Gerry Desjarlais (CE57) lost wife, Doris, in April of 2013 to cancer just six weeks short of their fifty-seventh anniversary. In November 2013 he married Maelyn McKinney, widowed in 2007. Their families had been friends since the 1970s. They now have a combined twelve children, twenty-one grandchildren, and five great-grandchildren. They enjoy travel and are singing in two choirs. They will spend summers in Maelyn’s Seattle home.

Frank Dvoracek (EE54) is still volunteering at El Dorado County Museum and a Gold Bug Park in Placerville, California.

Neil Elliott (EE56) and wife, Liz, moved to Fort Collins, Colorado, to be close to their son and their three grandkids.

John Goth (MetE50) enjoyed meeting and visiting with President Wilson a few months back. Things are the same as usual.

Harold Hanson (EE53) is going strong at eighty-five despite a weak left knee and spending the last two years as a widower. It has been sixty-one years since graduating from Mines and twenty-nine since retirement from Rockwell (North American Aviation). He has four wonderful great-grandchildren, from five grandchildren and two daughters. His son does not have children. His days are filled with volunteering, raving, and square dancing, as well as keeping up his 0.6 acres and a home.

Jim Hayes (GenE59) still travels and plays golf all over. All is well in sunny Arkansas. He gets to Rapid City almost every summer.

Everett Holgate (ME55) is “Still Alive”!

Richard Maki (MetE59) is still working with advice from his son, **Jon Maki** (MetE82). He winters in Sun City, Arizona, and summers in Hibbing, Minnesota.

Roger Rasmussen's (ChE58) wife, Katharine, is a 1956 BA graduate from University of Wyoming.

Jim Stillman's (ME55) wife of fifty-six years, Mary Elizabeth, (Bettie) died June 5, 2013 from complications during vascular surgery. She leaves behind their son (Jim Jr.), two daughters (Janine and Jennifer), two granddaughters, and two grandsons (Michael and William). She loved the Blue Ridge Mountains area where they live, which reminded her of the Black Hills, but loved her home Laurel Highlands area in Pennsylvania more.

Owen Tripp (ME50) claims he is dead ... just hasn't fallen over yet. He lost his wife of sixty-three years, Yvonne, in November 2013, which took a big piece of his life away. He thanks the Alumni Association for keeping the Mines Alumni alive.

J. Fred Voigt's (CE51) daughter Wendy Voigt Huckstadt lost her battle with cancer in 2013.

Wayne Wilcox (GenE58) participates in ASME, SAEW, and US TAGs to ISO on fasteners, fluid power, and filtration. He reviews several hundred technical standards per year and develops and revises standards. He is the chair of the SAE ship fluid system committee and secretary of the SAE ship fastener committee.

MEMORIALS

Harold G. Carlevato (MinE52)

Marvin H. Christman (Phys56)

Frederick J. Gerdes (GenE51)

Walter G. Gilbertson (MinE54)

Richard B. Haigh (EE56)

Donald A. Johnson (ME56)

Marvin E. Kiel (MinE53)

Alvin J. Kusters (EE58)

Donald E. Laughlin (ME58)

August L. McGuffin (ME53)

Darrell E. Munson (MetE54)

Roger L. Noss (CE57)

Howard C. Peterson (GeolE50)

Robert A. Sandmann (CE53)

Norman L. Shorb (MinE52)

James H. Whipple (CE57)

William A. Yuill (Chem57)

Ward H. Zimmerman (ME50)

1960s

Chester Anderson (CE60) hopes to make it back to South Dakota in the near future.

Warren Barnum (CE61) and Sally do not get around very well anymore and likely will not get back to Rapid City again. He still enjoys reading *The Hardrock*.

Vince Bertolotto (ME67) retired from Sundstrand Aerospace after thirty-one years and is contracting for United Technologies Aerospace Systems (UTC bought Sundstrand). He could not be having more fun this past year. They went to Mexico, Florida, and Alaska via land and sea. This next year will include Punta Cana, Florida, and northern Wisconsin.

Russell Buyse (EE63) and wife, Carolyn, continue to enjoy good health, which allows the opportunity to travel. They have visited Russia and Brazil this past year. **Randy Parcel** (ME67) and Tracy Kovach joined them in the Russia, in addition to trips to Denver for Broncos games.

Melva Cain (Chem69) retired from the University of Saint Thomas in March 2014.

Dennis Cullen (ChE62) returned to Minnesota for a couple days during the Christmas season to see family, but he joked that since his blood is so thin, he will stay where the weather is warm. All is great in Florida.

Jim Fry (ME64) is still working for Los Angeles County. He now has more than fifty years with it, both active and part time. He does not golf as much as he would like to but participates in plenty of grandpa duties. In the past few years they have traveled to Italy, Australia, New Zealand, and Fiji. Last year he made it to the fifty year graduation. It was a very pleasurable experience, and it was good to see many old and familiar faces. He plans to make it for the 2015 All School Reunion.

Dick Gelhaus (ChE65) lost his wife, Mary Jo, on March 17, 2014, after a seventeen year battle with breast cancer. Throughout her long battle with cancer, she remained very positive and upbeat.

Ralph Heinert (ME67) is enjoying retirement with outdoor activities, family get-togethers, and five grandchildren. He says he really appreciates the education he received at SDSM&T!

Dick Howard (ChE64) enjoys South Dakota life. Their priority is to equally spoil all of their fourteen grandchildren and one great grandchild. Since they live in South Dakota, Montana, Arizona, and Alaska, it requires some travel, which they enjoy a lot. He still works for the SD Assoc. of Townships part time and during the legislative session.

Leo Hughes (GeolE60) died on August 4, 2013, for over two minutes, until paramedics arrived. He had open heart surgery on August 7, 2013, and spent a month in the hospital and continues to recover. It's a slower process at seventy-seven. He lost twenty-five pounds in the process and does not recommend it as a weight loss program. Here's to a better year!

John Huyler (ChE68) is enjoying retirement, dividing time between the San Francisco Bay area and Minnesota. They have seven grandchildren in Minnesota, ages six to sixteen.

Gary Johnson (Geol63) and **Bill Schurmann** (GeolE65) roomed together in 1964-1965 in a converted chicken coop (honest) near Rapid Creek, east of campus. Bill was finishing his BS and Gary was trying to finish his MS. According to Gary, Bill was incredibly easy to get along with and eager to lend a helping hand when asked.

Gary Keffeler (ME68) successfully had both shoulders replaced and is now the Steel Shoulder Man. His wife, Jacqueline, just had the new surgery that places wires in your brain and a cell phone-sized signal generator in a pocket in the chest. She is now cleared of the Parkinson's Shakes. Miracles of science never cease. All in all the family is doing great; all that want them still have jobs.

Bashir Master (MSME67) is semi-retired and active as a director of technology for a dynamic EPC company launched by two of his longtime friends and colleagues from ABB Lummus Heat Transfer. His wife, Barbara, practices as a nurse and runs her company to provide holistic health coaching. Their five children graduated from six different Ivy League schools and practice law, medicine, ballet, marketing, and education. They have six beautiful grandchildren with another on the way. They keep very busy and are happy indeed.

Dan Matthaidess (ME63) says the Class of 1963's celebration of fifty years of engineering service was fantastic and memorable.

Len Neugebauer (CE69) is retired, but serves the engineering and surveying profession on the South Dakota Board of Technical Professions. He is currently chairman. He is a proud uncle to nephew, Jon Maschino, civil engineering junior.

E. Jay Preszler (ME65) lives in the Hat Ranch Development two miles south of Belle Fourche. Life in the Black Hills of western South Dakota is good. They say you can never come home, but they are going to prove that wrong. All the beauty of the Black Hills is within easy driving distance and invites anyone to come visit.

Jerl Pringle (EE68) and his wife, Renee, spent Christmas and New Years with their daughter, Jessica, and grandchildren, Emalyn, Kahne, and Lylah in Fayetteville, North Carolina. Jessica's husband, Chris, was deployed to Afghanistan in early December from Fort Bragg. Before and after their trip, they spent time with their daughter, Janell, and her husband, Jared, in Minneapolis.

Herbert Reichert (Math66) and his wife went on a twelve-day guided baseball bus tour in August 2013. They saw eight major league baseball games and two minor league games, plus spent one day at the Baseball Hall of Fame in Cooperstown, New York. It was a great trip with great weather and the highlight of their summer last year.

Ted Smolik (MetE63) and wife, Bonnie, had a pleasant trip to the Black Hills last spring for the fifty-year class reunion. It was very special. The tales and visits were enjoyable. This summer his consulting work will be cut in half, so retirement cannot be too far away.

Tom Snyder's (ME62) son was elected to a second four-year term with the Spokane, Washington, City Council.

Jon Spargur (ME61) is enjoying a new phase of being retired and living back in North Carolina close to where they lived fifteen

years ago. They have been seeing more of their grandchildren and doing house projects. They have traveled to Germany, France, along the North Carolina beaches, back to the Washington, DC, area to see friends and some Nationals baseball games, and to the Big Island of Hawaii. They have changed allegiance to North Carolina sports teams and are making new friends in the neighborhood and at church. He is always enthused by reading about the current activities and plans of SDSM&T and the opportunities for today's students.

Reyneld Stevens (ChE68) has five grandkids. All the kids are married or engaged. He is part of the grounds crew at Mountain Vista Golf Course, and as a result, all golf rounds are free. He and wife, Kaye, travel some, mostly to visit kids and grandkids and follow CSU sports.

David Uherka (Math60) has been retired for fourteen years in Cedar City, Utah. Health is good, and the major activities, besides reading and the arts, are golfing in the summer and Nordic skiing in the winter. They started a Nordic ski club and are working with the National Forest Service and Park Service to develop cross country trails. Dorothy heads the local watercolor society, and Dave reads mystery novels and enjoys mathematics.

MEMORIALS

Robert C. Graham (ME64)

Francis W. Kalkbrenner (Phys63)

Reece S. Palmer (ChE61)

Harry C. Rickard (CE61)

William R. Schurmann (GeolE65)

Randy L. Schwandt (CE67)

to Rapid City yearly for rounds of golf with a few alumni friends.

Mike Bates (EE70) retired on July 1, 2012. Summers are spent in South Dakota and the winter in South Carolina. The highlight of 2013 was a Canadian fishing trip with **Dave Krull** (Ex70), **Pete Birrenkott** (ME71), **Bob White** (CE72), **Jim Brown** (CE71) and **Les Thiel** (ME68).

Doug Brink (ME70) and wife, Virginia, recently relocated to Green Valley, Arizona, but will spend summers in Rapid City.

Casey Chord (EE79) and wife, Kari, moved from Phoenix to Prescott, Arizona. After thirty-four years in Phoenix, he had enough of the traffic, smog, heat, and stress. He retired from Honeywell's Aerospace division on disability after twenty years. He has had two liver transplants and complications with the second transplant. The liver was fine, but his body would not recover. Although he loved his job, working made his health worse, and he had to stop. Kari teaches piano. She has kept him alive through the illness. Married for twenty-eight years, they have one daughter and four grandkids.

Tom Cummings (GeolE73) is looking forward to spending time with his family, including grandchildren! Retirement is right around the corner.

1970s

Bob Apa (ChE72) finished up processing nerve/mustard gas in Oregon last year. He decided it was time to quit running around the country destroying hazardous waste and thus retired in Boise, Idaho. He feels it is a great place—close to the mountains yet little snow. He was in Rapid City right after the major October blizzard and was surprised at the damage to the trees and the cattle. They get back two to three times a year.

Scott Barber (ChE71) began consulting for UTi Worldwide after retiring as director of Global Logistics for Dow Corning in April of 2001 after consulting for them for more than twelve years. He and his wife live in The Villages in Florida where he plays golf and enjoys the year-round sunshine, blue skies, and warm weather. Their son, Nicholas, lives in Orlando where he sees him and their new granddaughter, Cadence, frequently. He is back



Vickie DeNeui holding Avery

Vickie DeNeui (Math73) is working part-time doing Software Consulting. Life is good since she travels a lot. The big news for the year was the birth of her first grandchild, Avery, who was eight months old at the time the photo was taken.

Gene Daley (GeolE72) retired in November 2011 after forty years in the oil and gas industry. They moved to Colorado in July 2013 to enjoy the mountains, outdoor life, and family, including grandkids! They are doing some traveling and enjoying life.

Steve Danekas (ME71) retired from CB&I after over forty-two years and plans to stay in Naperville, Illinois, close to six of their eight grandchildren.

Dan Daniels (ME72) retired from the printing company in December 2013 where he worked for the last twenty-one years.

John Dolan (GeolE77) and his wife, Kathy, had a wonderful

lunch with President Wilson last summer at the Casper Petroleum Club. He recently returned from a cruise around the North and South Islands of New Zealand.

Jan Dunker (Chem71) was married last September, and his wife is from Brazil.

Allen Gates (CE72) feels thirty-five years building dams for reclamation is enough. He spends time with his wife, house, and grandkids—all good stuff.

Karl Gerdes (ChE71) took the big leap to retirement in 2013. After more than thirty-five years with Chevron, it was time to start something. His wife, Pam, also retired from veterinary practice. They moved to Davis, California,

to down-shift from the more hectic pace of the San Francisco Bay area. They are enjoying not setting an alarm clock so early and being closer to the ski slopes.

Kurtis Haufschild (EE72) is working toward forty years with the phone company in August. He feels that after that, it might be time for fishing, hunting, and spending time with the grandkids.

Steve Hinman (EE78) still enjoys electrical engineering for the water and waste water industry. He is having fun with grandson Zeke, two, and looks forward to a second grandchild expected later this year! He is excited the Hardrockers are now in the RMAC and more games will be in his area!

David Hobler (Math76) settled with a great job after his stroke seven years ago. He enjoyed engineering but has discovered nursing as his passion.

Jerald Johnson (ME70) is happily retired. He spends his time volunteering for an organization supporting entrepreneurs and playing with his five, soon to be six, grandchildren.

Jerome Johnson (EE70) retired ten years ago for about six months. He is now investing in the UPS Store franchise in Rapid City, Sioux Falls, and Brookings.

William Jones (ME73) retired in 2012.

Kirby Mellegard (EE72) retired after thirty-seven years at RESPEC. He and Elaine are planning some travel, mostly in the US but will remain in Rapid City or at their cabin near Custer. He will continue some consulting as a private engineer.

Terry Mudder (Chem74) decided to retire as an international environmental consultant after many miles, years, and countries. He was recently inducted into the International Mining Hall of Fame. They scaled down to a small bungalow along a stream near Sheridan, Wyoming, near daughter, Hanna, and son-in-law, Steve. Providing daycare for grandson, Beckton, is of primary importance. Their son, Alex, is a marine geophysicist working on the coast of Australia. He shared that their health is good, and life in general is good!

David Opbroek (CE74) retired after thirty-four years with the US Army Corps of Engineers.

John Ormando (Phys79) recently retired after more than twenty-three years working at Intel.

Jim Pesek (ChE74) worked for DuPont for thirty-eight years and is president of Health, Safety, and Environment for Reliance Industries, a major refining and petrochemicals company in India. He lives with wife and daughter in

Mumbai, India. They just bought a home in Rapid City where they plan to retire in a couple of years.

Irshad Rana (MS MetE70) works as a project director at Fluor Corp in California. His wife Shahida is continuing her career as a scientist at LLNL. Their daughter and her family live in Dallas. Their son will be joining Baylor in Houston as a transplant surgeon.

Richard Rollo (CE71) retired as an Army LTC in 1992. Then retired as the administrator from Englewood Water District in Florida in 2010. He wrote and produced the Indie film "No Body Found," which is available on Amazon and through Blockbuster.

Arlen Schamber (CE74) retired from Hormel in March 2013.

Jerry Schley (ME73) was blessed with his first grandchild—Devin Lee Kruger. He asked himself how he got old enough to be a grandpa?!

Doug Schultze (ChE78) is still working for XTO Energy in Fort Worth, Texas, but is maintaining his house in Tulare, South Dakota. Retirement is approaching, but it is difficult to leave the rat race.

Arnold Victor (EE74) retired from Raytheon in December after more than thirty-nine years.

Joe Vig (CE71), group president of Astec Industries of Yankton, was honored recently as the Grasstops CEO of the Year by

the National Stone, Sand, and Gravel Association. He has been an outspoken champion of addressing the nation's deteriorating road and highway infrastructure. He was presented with the award during the NSSGA's annual convention in Las Vegas, Nevada.

David Wentland (CE73) is still working as a coastal engineering consultant and enjoys it very much. His wife, Jaelene, has retired from teaching after thirty-one years. Both of their daughters are married. They have two granddaughters, ages two and four.

MEMORIALS

Richard G. Crotwell (CE75)

Robert J. McRae (EE70)

1980s

Anthony Barnette (ChE88) is enjoying the challenges of a new career in the renewable fuels industry after twenty-three years in gas processing and sulfur recovery. He is still in Chicago's Northwest suburbs. His family is still in South Dakota, near Sioux Falls; he does not make it back to Rapid City much anymore. He does miss the Hills and hopes to make a trip back to the 'old stomping grounds.'

Tom Durkin (MS, Geol86) is still with the SD Space Grant Program on campus at SDSM&T and is enjoying it. He has been there since 1999. His wife, Cathy, began work in the math and computer science department last year.

Ronald Espeland (ME82) sends greetings to all his fellow Hardrocker friends and classmates. It's hard to believe he is starting his thirty-second year as a project engineer/project manager with what was Amoco Production Company, then BP Amoco and is now Tesoro Refining and Marketing Company, at the Mandan, North Dakota, refinery. In addition to engineering, he keeps busy with operating the family farm at Glenham, South Dakota, on weekends and vacations. He and Rose now have six grandkids that keep them busy whenever they have a chance to visit them in Bismarck and Cavalier, North Dakota, or in Las Vegas, Nevada. Ron invites anyone to give them a call if in the area.

Alan Hartman (ChE83) says it was nice to see and catch up with representative and fellow alumni at the Corvallis, Oregon, get-together in March.

Mike Jahraus (MetE84) resigned from Anglo Gold to start his second career as a bicycle mechanic. All is well in the high country of Colorado.

John Jacobson (ChE81) and wife, Barb, moved to Delhi, India, in January. Cargill is building a new (first) corn process facility in India. They enjoy India. Barb stays busy fostering injured 'street puppies', and they are getting to like the great food.

Mark Jelkin (ME84) was named vice president of engineering at Hutchinson Technology, Hutchinson, Minnesota. He joined the company in 1988 and has been the company's director of engineering and program development since 2006.

Tom Kelley (CE80) is the current national chair of Precast Concrete Institute (PCI). PCI is a national organization, which is the permanent body of knowledge when it comes to Precast Prestress Concrete. He has been president of Gage Brothers in Sioux Falls, South Dakota, since 2001 and has been employed by Gage Brothers since he graduated from Mines. Tom and Julie have four grandsons. Their children continue to do well. Amy is an OBGYN physician for Sanford Medical in Sioux Falls; Susan is manager of a consulting agency in Madison, South Dakota; and Tom (PhD Physics) is currently teaching at Northeastern University and MIT in Boston.

Michael Mutchler (MinE85) has been appointed chief operating officer for Largo Resources Ltd. He has more than thirty-three

years of experience in mining, most recently served as chief operating officer for Rainy River Resources, which was acquired by New Gold. Prior to his tenure with Rainy River, he served Kinross both as vice president of Project Development Services and as project director of the Paracatu Mine Optimization in Brazil. In addition, he worked for twenty years with ASARCO Incorporated in various operational roles. He also earned an MBA from Webster University and an Executive Juris Doctorate Degree from Concord School of Law.

Kevin Naser (ME82) retired from Omaha Public Power District, where he was manager of system engineering at Fort Calhoun Nuclear Power Station in October 2012. He has since taken a seasonal position with Siemens Energy, Inc. as a field engineer, doing what he loves—building turbines. He and wife, Brenda, were married on August 17, 2013. They live in wooded acreage near Fort Calhoun, Nebraska.

Jim Pirtle (MinE86) has taken a position as a maintenance operations program manager with the Louis Berber Group.

Brian Powers (GeolE82) suffered a stroke in October of 2012, after twenty-eight years with Amoco and then BP. He retired in February 2012 to further recuperate. He and Marsha split their time between Ohio and Florida.

Mark Rantapaa (GeolE87) is approaching twenty-three years with Barrick and has been at the Cortez mine for two years as the open pit manager. All is well in Elko, Nevada.

Steve Stokowski (MS Geol82) received the Herbert C. Hoover Award "in recognition of distinguished leadership, service and dedication to the Washington DC, Section of SME."

Tim Vottero's (Chem84) daughter, Amanda, married Ian Steckelberg (ME, Yankton) last year and she graduated from BHSU in May. She will begin teaching fifth grade at Grandview Elementary in Rapid City while Ian completes his senior year at SDSM&T. Daughters **Breanne Lundin** (ChE06) and **Corinne Heiberger** (IE08) and their families are doing well. Son Jonathan will be a high school senior next year.

Greg Winker (GeolE80) retired in 2013 and now spends most of his time traveling.

MEMORIALS

Richard W. Anderson (ME80)

Daniel M. Ommen (Phys86)



(l to r) Kerrick Dando (Nano), Eric Schmid (Nano), Jesse Hinricher (ME), David Salem (CAPE), Marc Robinson (CEE), Tony Kulesa (CE12), and Scott Vangen (EE82).

Scott Vangen (EE82) helped welcome a research team of SDSM&T faculty and graduate students who visited Kennedy Space Center (KSC) recently to present their progress on a structural thermal insulation composites project to develop materials for lunar or Martian habitats. Faculty Dr. David Salem and Dr. Marc Robinson, and graduate students **Kerrick Dando** (MS MES14) and Eric Schmid met NASA Space Technology Research Fellow **Tony Kulesa** (MS CE14) and presented to interested individuals from KSC. They also saw spring intern Jesse Hinricher during their visit. Thanks go to Tony for the photo and write-up.

1990s

Matthew Bunkers' (IS92) oldest daughter graduated from high school in May 2014. She plans to attend Black Hills State University. Their youngest two daughters will be in ninth and tenth grade in the fall of 2014.

Clinton Foster (CSc92) and wife, Michelle, welcomed their daughter, Lauryn, this past year. Lauryn and her brother, Levi, really enjoy playing together now. Clint was published in the 2013 issue of Disaster Recover Journal.

Kenneth Hargens (IS96) retired from the Army and Veterans Administration. He is building a new structure northwest of Hill City, South Dakota. He is restoring a family cabin in Custer State Park, too. He enjoys hiking, exploring, prospecting, traveling, and restoring vintage cars and motorcycles. He is developing a non-profit foundation for historic and cultural preservation in the Black Hills.

Nicole Mathis (IS93) and Ken moved from Colorado to Utah in February 2014. Arise asked Ken to take on the Utah territory full time as a boiler and pressure vessel inspector, and they jumped at the chance. Nicole finished at Amgen towards the end of 2013 and is now working in the regulatory affairs and quality assurance department at a local medical device company. Although they miss being closer to family and friends, they love their new location. There is a lot more room for the dogs to roam, the property backs to open space and the views of the Great Salt Lake, and mountain ranges are incredible.

MEMORIALS

Jeffrey A. Adams (EE95)



Luke Jeremiah Adam

Tami Heilman-Adam (ChE98) is happy to announce the arrival of baby Luke Jeremiah Adam, born on December 30, 2013.

2000s

Sara Hagie (ME08) moved from Maryland to Ohio at the end of April. They are looking forward to being closer to family, and their son Jack was born in August 2013.

Kristen Yates (GeolE05) was issued her South Dakota PE license in 2013. She continues to work for AET in Rapid City in their geotechnical division. Her husband Rob has been designing and developing a line of heavy duty aftermarket truck bumpers he will manufacture in Rapid City. The process has been time consuming and rewarding while he handles the day-to-day operations of his other local business—Chimney Canyon 4x4.

Tony Kulesa (CE12) along with two groups of Mines students, alumni, and faculty used spring break and their engineering expertise to improve the lives of others. Members of the Mines Engineers and Scientists Abroad (ESA) student chapter returned to Bogotá, Colombia, partnered with Ingenieria Sin Fronteras (Engineers Without Borders), and collaborated on two social projects in the Usme district of Bogotá—rainwater harvesting and landslide mitigation. Among the participants was new graduate **Kati Johnson** (ChE14). Another group traveled to Peru to help improve conditions at the Westfalia Orphanage, where ESA members designed and constructed new infrastructure to supply the orphanage with a permanent clean water source, new plumbing, solar energy to replace gas, and allow the addition of a fruit orchard. Thanks also go to Irma and **Richard Frank** (ME63), whose past donations and future commitments to fund international experiences have played a pivotal role in ESA's good deeds. The ESA Advisor at Mines is Dr. Thomas Fontaine (CEE faculty).



ESA Bogotá, Colombia group



ESA Lima, Peru group

Former Faculty and Friends

MEMORIALS

Wendell H. Hovey (Former Faculty)

Josephine Mason Lee (Former Faculty)

Lester W. Snyder (Former Faculty)



Josh Green with cardboard CAT excavator



Team Havoc (l to r) back row: Joe Vaith (ME07), Jon Odland (GeolE11), Jake Harens (EE06), Steve Snuggerud (Ex93) (l to r) front row: Ben Hanson (ME14), Shana Bauer (IS09), Dustin Johnson (Ex08), Mike Grave (ME09), Judy and Jeff Wahl (sponsors).

Mike Grave (ME09) and Team Havoc won again, raising more than \$1,500 towards a grand total of \$27K for Special Olympics of South Dakota. It was a great ending to another amazing summer at the lake!

Josh Green (ME11) is with CAT at their Seguin engine facility. He recently entered and competed in a cardboard boat race down one of the rivers just outside of Seguin. They built a cardboard Caterpillar Excavator for said event and the resulting product was nothing short of a masterpiece. It was painted Caterpillar yellow and airbrushed with some decals. He even engineered an articulating front arm with a bucket.

‘Dean Pete’ beloved by all



Fondly known as “Dean Pete” by students and colleagues alike, former Dean of Students **Howard Peterson** (GeolE50) died May 4, 2014, at the age of eighty-five. Peterson is remembered for his more than five decades of devotion to the School of Mines. A 1950 alumnus, he served at the university from 1957-1992, first as assistant and associate dean, then as dean of students for the last twenty-three years of his career.

Whether as a scholarship coach, Theta Tau advisor, or in his capacity as dean, Peterson was a beloved mentor to thousands over five decades. In 2004, a residence hall was named for Peterson.

Even after his retirement, Peterson remained a fixture around campus and often returned to visit with students and former colleagues in the Surbeck Center. He also served the School of Mines on both the SDSM&T Foundation and Hardrock Club boards of directors and as a volunteer scholarship coach for ten years after he retired.

Peterson was born June 28, 1928, in Alpena, where he graduated from high school in 1946. He earned a degree in geological engineering from the School of Mines in 1950, worked in oil exploration, and then taught at Redfield High School. He earned a master’s degree in education from

Northern State Teachers College in 1955. Peterson began his career at the School of Mines in 1957 and in 1969 earned a doctorate in psychology from the University of South Dakota.

At the School of Mines, he worked with a dedicated group of alumni to secure funding for a new student center, which would eventually be named the Surbeck Center. Even after his retirement he helped lead a successful first-ever capital campaign called Vision 2000 through the SDSM&T Foundation. In 1987, Peterson received the inaugural Making a Difference Award and in 1992 the prestigious Guy March Medal from the Alumni Association.

Two years ago Peterson was interviewed for a story in *The Hardrock* magazine observing M Hill’s 100th anniversary. He shared his vivid memories of the climb as a student to the top of the hill and the evolving tradition of whitewashing. “That was a big thing,” Peterson said. “We walked all the way. We were told as freshmen to have a gallon bucket and to meet down at what was the old post office at six in the morning. We walked to M Hill, and ... we crossed the creek, dipped a bucket of water and carried it to mix the concrete for the plaque and to whitewash it.”

AREA MEETINGS

1. Rapid City, SD–Alumni Recognition Dinner: (l to r) Dee Raymond (Alumni Office), **Matt Robinson** (CE14), and Alumni President **Carmen Adams** (ChE75) ready for the show!



2. Rapid City, SD–Alumni Recognition Dinner: (l to r) **Jim Green** (ME74), **Ron Jeitz** (CE69), **Susan Banks** (GeolE75), **Bob Miesen** (CE61), **Roger Kiel** (GenE58), Anne Ekern (SDSM&T Foundation)

3. Rapid City, SD–Alumni Recognition Dinner: Master Chorale jamming!



4. Rapid City, SD – Alumni Recognition Dinner: **Carmen Adams** (ChE75) and **Anita Freeman** (EE76)

5. Rapid City, SD–Alumni Recognition Dinner: 2014 Outstanding Recent Graduates (front row, l to r) **Vanessa Victor** (CE05), **Lisa Schlink** (MetE04), **Andrea Johnson** (EE03), **Linda Foster** (GeolE03), **Jody Sting** (IE03); (back row, l to r) **Abe Kean** (CEng03), **Nickolas Beukema** (MinE03), **Keith Flanagan** (ChE03), **Darryn Frafford** (Math03); (not pictured) **Jeremy Banik** (ME04), **Andrew Farke** (Geol03), **John Walton** (CSc04)



6. Rapid City, SD–Alumni Recognition Dinner: **Carmen Adams** (ChE75) and **Tim Vottero** (Chem84)

7. Rapid City, SD–Alumni Weekend Golf Tourney: (l to r) **Hugh Boyle** (CE79), **Ken Wrede** (MinE77), **Joe Corbett** (GeolE82), **Bruce Franzen** (MinE82), **Rick Wass** (IS96)

8. Rapid City, SD–Alumni Weekend Golf Tourney: (front row, l to r) **Larry Simonson** (CE69), **Bob Miesen** (CE61), Nate Brown (Hardrock Club); (back row, l to r) The Four Horsemen–**Rick Wass**



AREA MEETINGS



(IS96), **Bruce Franzen** (MinE82), **Al Baue** (MinE82), **Dave Litzen** (ChE81)

9. Rapid City, SD–Alumni Weekend Zero Year Reunion: **Carmen Adams** applauding the seniors

10. Rapid City, SD–Alumni Weekend Zero Year Reunion: **Linda Rausch** (ChE75), **Susan Banks** (GeolE75), **Carmen Adams** (ChE75)

11. Pierre, SD–19th Annual Tailgate Party: (l to r) Tami Vottero, **Carmen Adams** (ChE75), Mary Kennon, **Mike Cepak** (MinE76), **Linda Rausch** (ChE75)

12. Pierre, SD–19th Annual Tailgate Party: (l to r) **Clyde Jundt** (CE57), **Wally Larsen** (MinE53), **Carmen Adams** (ChE75), **Jeremy Pirner** (ME12), **Drew Huiskien** (CE12)

13. Pierre, SD–19th Annual Tailgate Party: Cooking Contest Winners (l to r) **Jeanne Goodman** (GeolE79), **Vern Bump** (GeolE61), **John Childs** (CE72), **Darold Krein** (GeolE82), **Dale Healey** (IE06), **Marc Macy** (GeolE04), **Mike Perkovich** ((MinE83), **Brian Gustafson** (GeolE81)

14. Pierre, SD–19th Annual Tailgate Party: Alumni Group

15. Salt Lake City, UT–Dinner at Bucca de Bepo: (l to r) **Steve Bartlett** (EE71), Arlene Bartlett, **Jerry Hanten** (MetE76), **Carmen Adams** (ChE75), Tami and **Tim Vottero** (Chem84), **Elijah**, **Corinne** (IE08) and **Kevin Heiberger** (ME07), **Tasha Baker** (MetE10), Justin Cote, **Terry Meidinger** (ME76)

16. Salt Lake City, UT–Tracy Aviary: (front row, l to r) **Kevin** (ME07), **Corinne** (IE08), and **Elijah Heiberger**, Rachel Suek, Janelle Suek; (back row, l to r) **Oliver “Bud” Petik** (EE64), **Adam**

AREA MEETINGS

Lungren (ME08), Amanda Lungren holding Hazel Suek, Mary Petik, **Carmen Adams** (ChE75), **Jesse** (CEng04) and **Sarah Suek** (IE06); (not pictured) Tami Vottero

17. Salt Lake City, UT–SME Social: Mines President Heather Wilson addressing the group

18. Salt Lake City, UT–SME Social: **J. D. Wientjes** (MinE79) and **Mike Selzer** (EE74)

19. Salt Lake City, UT–SME Social: **Terry Meidinger** (ME76), **Doug Schlepp** (MetE74), **Mike Selzer** (EE74), **Tom Ochsner** (MinE78), Heather Wilson

20. Salt Lake City, UT–**Carmen Adams** (ChE75) at SME social

21. Silverdale, WA–Yacht Club Broiler: (l to r) **Greg Hess** (CE82), **Carmen Adams** (ChE75), **Marlene Nelson** (ME74), Carol and **Tom Warborg** (ChE63)

22. Seattle, WA–Anthony's Homeport Shilshole Bay: (front row) **Caroline Zebroski** (ME85), **Melissa Skelton** (IE00), Carolyn and **Ron Perrone** (CE70), **Charlie Chambers** (ME69), **Kathy Miller** (Chem74), **Marlene Nelson** (ME74), **Ken Miller** (ME75), **Carmen Adams** (ChE75), **Larry Henry** (CE61), **Terry Heil** (ME55), **Vernon Abild** (EE50) and Pat Abild; (back row) Heather Wilson, **Larry Merkle** (CE63), **Sue** (MetE85) and **Jim Laurenti** (ME84), **Karen Eidsness** (CE83), **Claudia** (Ex70) and **Steve Hoffman** (CE71), Rosemary Frerk, **Jim Hughes** (EE77), (far back) **Dennis Schnabel** (Phys72), **Dave Frerk** (ME61), **Mike Selzer** (EE74), **Tom Corcoran** (CE83), **Lars Ditlev** (MetE74); (not pictured) Robin and **Pete Chikos** (CE79), other spouses and non-alumni guests



AREA MEETINGS



19



20



21



22



23



24



25



26

23. Mount Vernon, WA–The Farmhouse:
(1 to r) **Ward Zimmerman** (ME50), Margaret Mitchell, Jean and **Dick Snyder** (CE61), **Vernon Abild** (EE50) and Pat Abild, **Carmen Adams** (ChE75), **Bob Pederson** (ME60), **Marlene Nelson** (ME74)

24. Portland, OR–Bridgeport Brewpub:
(1 to r) **Marlene Nelson** (ME74), **Steve Bintliff** (EE84), **Marijane White** (CEng99), **Brad Johnson** (EE92), **Jeff Johnson** (EE86), **Carmen Adams** (ChE75), **Wayne Todd** (ME93), **Luanne Zoller** (ChE79)

25. Corvallis, OR–Big River: **Brad Johnson** (EE92), Sandy Rider, **Jeff Johnson** (EE86), **Carmen Adams** (ChE75), **Marlene Nelson** (ME74), **Nora (Wells) Hartman** (Ex80), **Alan Hartman** (ChE83)

26. Beaverton, OR–Vondenkamp BBQ:
(1 to r) **Jeff Johnson** (EE86), Connie Johnson, **Roy Fox** (CE43), **Marlene Nelson** (ME74), **Michelle Vondenkamp** (CSc89), Jim Vondenkamp, **Carmen Adams** (ChE75), **Lana Reilly** (Roy Fox's Daughter), **Steve Bintliff** (EE84), **Brad Johnson** (EE92)

27. Richland, WA–Barnard Griffin Winery: (front row, 1 to r) **Carmen Adams** (ChE75), **Scott Nelson** (ME89), **Marlene Nelson** (ME74); (back row, 1 to r) Christine Watson, **Ken Wells** (ChE87), **Jim Watson** (M.S. TMgt94), Teresa and **Dale Obenauer** (ChE75), **Dan Weinacht** (ME84), **Dave Polzin** (ME86), Dabney Polzin, **Dick Moen** (MetE62), Mary Jo Moen, **Michael Schliebe** (ChE75), Andrea Nelson, Carol and **George Garlick** (EE58), **Brad Johnson** (EE92); (not pictured) **Marv Olson** (ME69)

AREA MEETINGS

28. Aberdeen, SD–Maverick's Stake & Cocktails: (l to r) **Jerry Schley** (ME73), **Larry Mettler** (EE89), **Chris Haar** (EE93), **Racheal (Mettler) Woodward** (EE08), **Blake Woodward** (ME09), Pam Larson, **Glenn Larson** (ChE71), **Eric Larson** (EE05)



29. Houston, TX–The Goode Company BBQ: (l to r) **Robb Winter** (CBE Faculty), **Steven Hansen** (ChE81), **Mike Litschewski**, (ChE81), **Jim Konst** (ChE73), **Gary Christman** (ChE74), **Joel Guillaume** (ChE97), **Mark Stoebner** (ChE69), **Travis Noah** (ChE13), **Lee** (EE88) and **Karen Swindler** (ChE88), **Teneil** (MetE11) and **Christopher Dollarhide** (ChE12), Zach Hochhalter, **Sue Douglas** (ChE77), **Dustin Kohler** (ChE11), **Michael Patten** (ChE95), **Rose Luvaas** (ChE08), **Bob Miesen** (CE61), Britney Alley, **Bill Barber** (ChE70); (not pictured) **Bre Lundin** (ChE06)



30. Houston, TX–Wildcat Golf Club: (l to r) Nate Brown (Hardrock Club), **Bob Miesen** (CE61), Heather Wilson (SDSM&T President)



31. Houston, TX–Houston Zoo: (l to r) Heather Wilson (SDSM&T President), **Jarrett** (ACM12) and **Cassie Brenner** (EnvE11) with Amber (in stroller), (far back) **Mike Selzer** (EE74), Ian and **Breanne Lundin** (ChE06) with Maelle, Annigale, and Eleanor, Tami Vottero, **Sue Douglas** (ChE77), **Ron Jeitz** (CE69)



32. Houston, TX–Houston Zoo: (l to r) **Jarrett** (ACM12) and **Cassie Brenner** (EnvE11) holding Amber, **Carmen Adams** (ChE75), **Michelle Kelly** (EnvE13) holding Owen and **Drew Kelly** (MetE11)





33. Houston, TX–Cadillac Bar: Becky Miesen selling raffle tickets

34. Houston, TX–Cadillac Bar: The Houston Dinner Group

35. Austin, TX–Tres Amigos: (l to r) **Paul Barker** (ME66), Gail and **Dale Westendorf** (ChE71), **Jerry Moench** (EE71), **Tom Hoffman** (EE69), Judy Moench, **John Coddington** (EE84), LaTreace and **Geoff Hawkins** (GeolE81), Mark Nixon, **Tom Grimshaw** (GeolE67), **Nancy Nixon** (CSc89), Victor and **Sandra Kastner** (MinE78), **Dave Glanzer** (EE74), **Bob Miesen** (CE61), **Karl Schiller** (MinE67), **Carmen Adams** (ChE75), **Tom Winn** (M.S. Math71) and DeAnne Winn, **Milford Peterson** (CE61) and Jackie Peterson, **Tom Ochsner** (MinE78) and Bonnie Ochsner; (not pictured) Becky Miesen

36. Chandler, AZ–Ocotillo Golf Resort, 6th Annual Mines Masters: John and **Carmen Adams** (ChE75)

37. Chandler, AZ–Ocotillo Golf Resort, 6th Annual Mines Masters: (l to r) **Doug Schlepp** (MetE74), **Ralph Wagner** (CE75), **Joe Vig** (CE71), **Mark Lux** (MinE80)

38. Chandler, AZ–Ocotillo Golf Resort, 6th Annual Mines Masters: The Winners! (l to r) **Roy Pulfrey** (CE76), **John Hull** (MinE77), **Mike Selzer** (EE74); (not pictured) **Bob Steever** (CE74)

39. Chandler, AZ–Ocotillo Golf Resort, 6th Annual Mines Masters Group

AREA MEETINGS

40. Rapid City, SD—Class of 64: 50-Year Grads back to class with Dr. Dan Dolan.



40

41. Rapid City, SD—Class of 1964: (l to r) **Jim Campbell** (ChE64), **Jim Curnow** (ChE64), **Dick Howard** (ChE64), Jean Callaghan, Patricia Merrow, **Gary Miller** (ChE64), **George Callaghan** (ChE64), **Dave Christensen** (ChE64), **George Niederauer** (Math64), **Jim Clark** (ChE64); (on steps) Robb Winter (CBE Faculty)



41

42. Rapid City, SD—Class of 64: (standing, l to r) Barbara and **Ron Gross** (EE64), Carol and **Paul Besselievre** (EE64), Theresa and **Tex Longcor** (EE64), **Dave Sorum** (EE65), Roberta and **Jerry Takle** (EE64), Myrna and **Jerry Landt** (EE64); (sitting) Kazem Sohraby (ECE Faculty)



42

43. Rapid City, SD—Class of 64



43

44. Mitchell, SD—The Grille: (l to r): **Roger Musick** (EE71) and Vicky Musick, **Danielle** (Geol05) and **Kevin Erdmann** (ME04), Lisa and **Keith Beck** (EE90)



44

45. Pittsburgh, PA—Cain's Saloon: **Tim Vottero** (Chem84), **Adam Dutil** (MinE10), **Suresh Santhanam** (MS Metro 79), **John Nielson** (MinE08), **Susan Banks** (GeolE75), **Dennis Poage** (EE67), **Carmen Adams** (ChE75), **Dan Mueller** (IE03), **Steve Uttecht** (EE92), **Steve de Kramer** (ChE70) and Marcia de Kramer, **Mike Selzer** (EE74), **Chuck Niehaus** (ChE84) and Laura Niehaus, Bob Glodowski (MetE67); not pictured **Tony Fishovitz** (EE80)



45

46. McLean, VA—Washington Golf & Country Club: Luncheon Group



46

47. McLean, VA—Washington Golf & Country Club: (l to r) Heather Wilson (SDSM&T President), **Bill Tucker** (GeolE56), **Carmen Adams** (ChE75)



47

PLACEMENT

the proof is in the numbers

\$70,933

Average starting salary for a 2013 Mines Geological Engineering graduate

246

Total number of graduates placed in 2013

43

Number of graduates attending grad school in South Dakota

32

The number of **states** where our undergrads went to work

12

Number of majors with 100% placement

Chemistry, Computer Engineering, Computer Science, Electrical Engineering, Environmental Engineering, Geological Engineering, Interdisciplinary Sciences, Math, Mechanical Engineering, Metallurgical Engineering, Mining Engineering, Physics

98%

Overall placement rate in 2013

110

Number of employers which hired 2013 Mines graduates

SOUTH DAKOTA



SCHOOL OF MINES
& TECHNOLOGY

501 E. Saint Joseph St.
Rapid City, SD 57701

