An Even Greater Team

2015 Annual Report
Dear South Dakota School of Mines & Technology Friends,

The School of Mines is an exceptional engineering and science university.

In 2014 we updated our Strategic Plan to guide our efforts to meet the challenges of the twenty-first century.

We believe in being accountable to our students and their families, to the people of South Dakota and their representatives, and to the community we serve.

This annual report is intended to give you insight on how we are doing and the progress we are making toward becoming an even greater team.

Sincerely,

Heather Wilson
President
South Dakota School of Mines & Technology
An Even Greater Team

**GOAL ONE**
Student Success
Prepare more undergraduate students for leadership in engineering and science.

**GOAL TWO**
Research
Increase research to prepare science and engineering experts, advance knowledge, and catalyze economic development.

**GOAL THREE**
Facilities
Redevelop and expand needed living, learning, and research spaces.

**GOAL FOUR**
People
Recruit, develop, and retain excellent faculty and staff.

**GOAL FIVE**
Administration
Responsible steward financial and physical resources.

**GOAL SIX**
Development
Establish a robust culture of philanthropy to enable the university to sustain excellence.
Twenty-first century problems will require more well-educated people to solve them. The region and the nation need more engineers and scientists. We are committed to doing our part to meet this need.

Mines is on track to grow to an undergraduate student body of 3,000, a 5 percent annual growth rate.

We are redoubling our efforts to admit students who can succeed at Mines and give them personal attention, engaged learning experiences, and high-quality instruction so that they master our challenging curriculum.

Our goal is for over 83 percent of freshmen to persist to sophomore year and for 54 percent of students to graduate in six years or less.

Student Success
Goal: Prepare more undergraduate students for leadership in engineering and science.

98% placement rate among 2013-2014 graduates: The placement goal is 96%.

78% of 2013-2014 graduates gained experience through internships and co-ops.

77.6% freshman-to-sophomore retention rate in 2015: The retention goal is 83%.

45.1% 2007-2014 cohort graduation rate: The student graduation goal is 54%.
Doctoral candidate Anne-Marie Suriano is spending the next academic year on a prestigious US Department of Energy Office of Science appointment at the Pacific Northwest National Laboratory in Richland, Washington. The 2015 Science Graduate Research Award recipient who is pursuing her doctorate in the materials engineering and science program at South Dakota Mines began her appointment in May of 2015.

Suriano will investigate the electrodeposition of ultra-high purity copper alloys for use in low background experiments, such as those at the Sanford Underground Research Facility in Lead, South Dakota. This research is an extension of her work at the Sanford Laboratory, where she has been helping to create the purest copper in the world for the Majorana Demonstrator experiment being conducted nearly one mile underground.

The worldwide Majorana collaboration is searching for evidence of neutrinoless double-beta decay. Its detection could help measure the mass of the neutrino. At Sanford, Suriano works closely with Mines’ faculty member Cabot-Ann Christofferson, Majorana liaison and deputy director.

Soon after graduating from South Dakota Mines in December 2014, Ryan Brown began working at the NASA Mission Control at the Johnson Space Center to support the International Space Station. Entry-level positions like Brown’s come exclusively through the highly competitive “NASA Pathways Intern” program, which serves as a talent pipeline for the space agency. With the support and guidance of Mines’ Career & Professional Development Center, Ryan completed three internships with NASA leading to a full-time job offer.

Brown started making an impact during his first of three fifteen-week NASA experiences. While the computer engineering major was officially tasked with developing software simulation for astronauts to train for moon landings, he and a fellow intern soon embarked on an additional project that made NASA take note: three-dimensional head tracking in simulated conditions.

The Rapid City native is an eight-year US Army combat veteran.

530 students completed internships at 225 employers in 36 states*

*Numbers reflect the 2014-2015 academic year.

Companies include 3M, Microsoft, Amazon, NASA, ExxonMobil, and Ford
Travis Davis, a senior mechanical engineering major at the School of Mines, has been selected as a George J. Mitchell Scholar, a prestigious scholarship awarded to just twelve applicants nationwide.

Davis, of Camp Cook, South Dakota, spent the 2014-2015 academic year studying bioengineering at Trinity College Dublin. The US-Ireland Alliance selected recipients for one year of postgraduate study in any discipline offered by institutions of higher learning in Ireland and Northern Ireland. Applicants were judged on three criteria—scholarship, leadership, and a sustained commitment to community and public service.

Early in his college career, Davis worked at John Deere, Caterpillar, and at NASA with the Program in partnership with Oglala Lakota College. Its collaboration with other Mines students, Rust helped build a greenhouse on the Pine Ridge Reservation, bringing fresh produce to a US Department of Agriculture-declared food desert.

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

In 2014 he was awarded a $10,700 stipend from the South Dakota Space Grant Consortium for a sixteen-week NASA internship at the Kennedy Space Center. During his semester-long internship, Hinricher focused on lunar excavation, determining whether inks and substrates used for 3D printing of electronic circuits are capable of withstanding the harsh environment of space. Though most of his research will be conducted in the Direct Write Lab and Department of Materials & Metallurgical Engineering on campus, the Rapid City native is also spending time researching at NASA facilities.

Graduate student Ian Markon is completing the first full-year of a NASA Space Technology Research Fellowship. The $68,000 fellowship continues through December of 2015 for Markon, who earned his Bachelor of Science degree at South Dakota Mines and is currently pursuing his Master of Science degree, also at Mines, both in materials engineering and science.

Markon’s research is focused on determining whether inks and substrates used for 3D printing of electronic circuits are capable of withstanding the harsh environment of space. Though most of his research will be conducted in the Direct Write Lab and Department of Materials & Metallurgical Engineering on campus, the Rapid City native is also spending time researching at NASA facilities.

Geology major Tyler Rust from Rapid City was awarded a 2015 Udall Scholarship, becoming the second South Dakota Mines student in as many years to earn the prestigious national scholarship.

Rust, a senior who is also pursuing a geospatial technology minor, chose his field of study to protect and develop tribal public policies with an eye to environmental concerns, sustainability, and stewardship of land. The Udall carries a $5,000 award.

Rust serves as vice president of the Noebekk Society and president of Noebekk Unit and is also involved in Student Association Senate, Society of Economic Geologists, and the Tech Geological Association. A National Science Foundation (NSF) Tiospaye Scholar and All Nations AMP Scholar, Rust also pursues research in geology, water resources, sustainable housing, solar energy, and archaeology as part of the NSF Pre-Engineering Education Collaborative Program in partnership with Oglala Lakota College. Its collaboration with other Mines students, Rust helped build a greenhouse on the Pine Ridge Reservation, bringing fresh produce to a US Department of Agriculture-declared food desert.

Janelle Strampe, a South Dakota Mines double-sport athlete who excelled in women’s volleyball as a four-year starter and two-year team captain, in July was named the 2015 Rocky Mountain Athletic Conference (RMAC) Woman Athlete of the Year by the National Collegiate Athletic Association (NCAA). The honor recognizes academic achievement, athletic excellence, community service, and leadership.

Also a standout basketball player, Strampe was awarded the 2013-14 NCAA Postgraduate Scholarship, the first from Mines to receive the honor.

A chemical engineering major from Green River, Wyoming, Strampe graduated summa cum laude in 2014. She earned a biomedical engineering master’s at Mines in 2015 and will attend the University of Washington School of Medicine in the fall.

Strampe received many academic honors at Mines, including the Tau Beta Pi Fellowship Award, Air Force Outstanding Math and Science Award, and D2 Athletic Directors Association Academic Achievement Award. She also served as Tau Beta Pi vice president, traveled on a mission trip with Engineers & Scientists Abroad, and volunteered at Youth & Family Services.
A challenging curriculum, personal attention, and experiential learning are central to the Mines experience.

Mines Advantage is a professional development program established in 2013 that focuses on six core experiential and professional competency areas: career preparation; cultural and global diversity; community involvement; personal development; leadership and teamwork; and communication. In the last year the program has increased from 400 participating students to nearly 1,200.

By participating in thirty curricular and co-curricular experiences from freshman year to senior year, students will hone their job-readiness skills and develop into well-rounded professionals through real-world experiences.

Participation Growth
2013 to 2015

Service
17

17 groups participated in the collection of over 3,000 pounds of food in the 2015 Food Drive

8,543

8,543 number of service hours recorded in 2014-2015

400

400 students volunteered 800 hours before the first day of fall 2014 classes on the Freshman Day of Service
Brian Freed

Brian Freed’s collegiate career came to a triumphant close with an All-American honor and national rankings in the men’s hammer throw and discus competitions at the NCAA Division II Outdoor Championships in May of 2014.

Freed was the first Hardrocker to earn NCAA DII All-American status and the first to compete in an NCAA DII post-season championship. The civil engineering graduate from Staunton, Virginia, earned All-American honors in the men’s hammer throw when he placed seventh nationally.

He holds the SD Mines school record at 199-0. In the men’s discus at the NCAA Division II Outdoor Championships, Freed came in with the No. 1 national ranking at 180-6 and holds the school record at 184-2.

Freed is now pursuing a master’s degree in civil and environmental engineering at Mines and is an assistant track and field throws coach.

The Women in Science and Engineering (WiSE) program is designed to educate, recruit, retain, and graduate academically motivated women in science, technology, engineering, and math fields through mentoring, professional development, networking, and scholarship support. Twenty-two percent of the 2,798 students in the fall of 2014 were women. Women graduates from Mines are in demand, attracting higher starting salaries than their male counterparts—$64,342 for 2013-2014 bachelor’s degree graduates. In 2014, Mines expanded our successful mentoring program so that every freshman woman has an upperclass woman mentor. Retention of women in 2014 exceeded retention of men and exceeded our goal of 83 percent freshman-to-sophomore retention.
Research

Goal: Increase research to prepare science and engineering experts, advance knowledge, and catalyze economic development.

Research is an integral part of the South Dakota School of Mines & Technology mission. SD Mines is engaged in cutting-edge research in a number of important areas of science and engineering.

The university is home to twelve research laboratories and centers, where scientists and engineers tackle an array of problems ranging from answering basic scientific questions about the nature of the universe to solving practical industrial problems.

Research efforts fall into four focus areas—energy and environment; materials and manufacturing; underground science and engineering; and science, technology, engineering, and math education.

Research expenditures in FY15 increased to $13.8 million, compared to $9.4 million in FY14. Mines researchers earned $15.1 million in new awards in FY15. The largest percentage of awards, 52.5 percent, was from the Department of Defense. Other sources of research funding include the National Science Foundation, NASA, Department of Energy, other federal agencies, and the state of South Dakota.

New Awards
Fiscal Year 2015

$15.1M
in new awards

Research Expenditures
2014-2015 comparison

Research expenditures in FY15 increased to $13.8 million, compared to $9.4 million in FY14. Mines researchers earned $15.1 million in new awards in FY15. The largest percentage of awards, 52.5 percent, was from the Department of Defense. Other sources of research funding include the National Science Foundation, NASA, Department of Energy, other federal agencies, and the state of South Dakota.

94
PhD enrollment fall of 2014
up from 78 in 2011

16
invention disclosures
in 2014-2015

$15.1M
in new research awards for FY15

2
license agreements
in FY15
A large multidisciplinary team of faculty researchers from South Dakota Mines was awarded a $4.8 million research contract from the United States Air Force in the fall of 2014 to develop ultra-efficient energy technologies to improve military performance in hostile environments.

The goal is to provide energy independence for the Air Force in often unfriendly or austere settings by reducing the need for fuel and water to be delivered and by lowering the amount of solid waste that must be removed from bases.

In addition to conserving water, liquid and gaseous fuels from base waste could be converted into electricity, heat, and other forms of energy, providing green renewable energy and meeting the Air Force’s strategic plan priority of assuring supply. A full-scale prototype combining novel anaerobic and aerobic processes for solid waste conversion into useable on-site energy is being developed by Mines researchers.

While the end goal is to reduce Air Force demand for energy, the effort also offers economic development opportunities for the university. The $4.8 million contract was awarded to SD Mines largely due to recently completed multidisciplinary faculty research, which has positioned the university to deliver commercial prototypes, a requirement for this project.

The university’s multidisciplinary team includes:

- Department of Chemical & Biological Engineering—Sookie Bang, Kenneth Benjamin, David Dixon, Patrick Gilcrease, Todd Merilaus, Jan Puszynski, Rajesh Sani, Anuradha Shende, Rajesh Shende, and Robb Winter (project director)
- Department of Electrical & Computer Engineering—Yucheng Zhang
- Department of Civil & Environmental Engineering—James Stone
- Department of Chemistry & Applied Biological Sciences—Sookie Bang, Hao Fong, and Rajesh Sani

### $1.1 Million Army Research Laboratory Contract

The Army Research Laboratory awarded a $1.1 million contract to South Dakota Mines in the fall of 2014 to develop materials to better protect soldiers and to research mineral extraction methods that could ultimately reduce America’s reliance on foreign metals in electronics.

Specifics of research areas key to future Army operations:

- Specialized composites for attenuation of impact and blast loading—The goal of this research is to produce materials for soldier protective armor, such as combat helmets, which strongly mitigate the effects of blasts and minimize neurological damage, including traumatic brain injury.
  - David Salem, PhD, director of the Composites and Polymer Engineering Laboratory, is principal investigator.

- Protective armor for extremities—This research would develop protection to the extremities against shrapnel ejected from improvised explosive devices encountered by ground troops and is a continuation of work by principal investigator Karim Muci-Kuchler, PhD, professor of mechanical engineering and co-director of the Experimental and Computational Mechanics Laboratory.

- Critical metallurgy research in strategic minerals and rare earth elements—This research could result in the cost-effective recovery of metallic elements from mines within the United States necessary for smartphone displays and high-power magnets, reducing the country’s dependence on China for these metals.
  - William Cross, PhD, professor of metallurgical engineering, is principal investigator.

Jan Puszynski, PhD, vice president for research, is recipient project manager.

### $4.8 Million Air Force Contract

Lori Groven, PhD, assistant professor of chemical engineering, received the Young Investigator Award from the Defense Threat Reduction Agency in the fall of 2014 to research materials to combat weapons of mass destruction.

The Defense Threat Reduction Agency award is a coveted, highly competitive program, with just three to four science and engineering researchers nationally honored each year. Groven is receiving $300,000 for three years to develop research in printable polymer-bound reactivives, with the option of two additional years of funding at $100,000 per year. A doctoral student and several undergraduates are assisting in the research.

Groven earned her bachelor’s degree, master’s degree, and doctorate at South Dakota Mines. She joined the faculty in 2013. Pictured above, Groven (right) and student Claire Pearse set off a series of explosive reactions.
Energy Resources Initiative

In the summer of 2014, the School of Mines announced the new Energy Resources Initiative, designed to encompass both research and teaching to better meet needs of the oil and gas industry. Within a year, more than $1.4 million was raised to begin the search for an exceptional faculty member to lead the initiative.

The new director will have broad leadership responsibility for significant research, teaching, fundraising, and further development of the initiative.

South Dakota Mines’ energy program includes a new a minor in petroleum systems and leverages the university’s expertise and research in rock properties, water resources, and materials development, as well as its location in an energy-rich pocket of the country, within 300 miles of the Williston, Denver, and Powder River basins. A graduate certificate in petroleum systems was recently approved by the South Dakota Board of Regents and will be offered in the fall of 2015.

With 20 percent of SD Mines graduates already hired into the energy industry, the interdisciplinary Energy Resources Initiative aims to better prepare students. In 2014 South Dakota Mines was among a handful of higher education institutions invited to testify before a Congressional subcommittee on our energy education efforts.

Laurie Anderson, PhD, head of the Department of Geology & Geological Engineering, has played a key role in development of the new Energy Resources Initiative, with Foundation officers and industry representatives Ron Jeitz and Steve O’Rourke leading development efforts.

Shale Research Institute

The university’s energy effort includes the Shale Research Institute, announced in the spring of 2014 after receiving $464,000 in funding by the South Dakota Legislature for the study of shale behavior, including the possibility of enhanced energy production, carbon dioxide sequestration, underground hydrocarbon storage, and waste disposal in shale.

Last summer, SD Mines and industry partner RESPEC drilled for shale core in Fort Pierre and are continuing geo-mechanical analysis on the findings to assess the feasibility of what could be the nation’s first underground shale research laboratory.

Lance Roberts, PhD, head of the Department of Mining Engineering & Management, is leading the Shale Research Initiative.
Frank Strieder
One of SD Mines’ new physicists, Frank Strieder, PhD, joined the faculty research ranks as principal investigator of a project to be conducted a mile below the earth’s surface at the Sanford Underground Research Facility.

Strieder is leading the Compact Accelerator System Performing Astrophysical Research (CASPAR) project, which could help complete our picture of the mechanisms that generate energy in stars, the number of neutrinos that are produced in the Sun, and how the elements in the universe are built. Strieder previously worked with the world’s first underground accelerator project, the Laboratory for Underground Nuclear Astrophysics, at Gran Sasso Laboratory in Italy.

The CASPAR accelerator will help researchers mimic nuclear fusion in stars. As with all other experiments in the Sanford Laboratory, the CASPAR experiment goes deep underground to escape cosmic radiation.

Over the past year, construction of the CASPAR cavity in Sanford’s 4,850-foot-deep level has transformed an old mining area into a modern science laboratory. The experiment is expected to be fully operational by January of 2016.

The CASPAR team, which also includes the Colorado School of Mines and the University of Notre Dame, is funded primarily by the South Dakota Science & Technology Authority, the University of Notre Dame, and the National Science Foundation. Notre Dame provided the accelerator and was responsible for its technical improvement.

Tyler Artz
Tyler Artz, who earned his bachelor’s degree in mining engineering in May of 2015, was awarded a $10,000 RESPEC Undergraduate Research Grant to create a new ventilation model 4,800 feet underground at the Sanford Underground Research Facility.

Artz produced an up-to-date computer model of the facility’s ventilation system, which currently uses fans designed for industry practice. His work offers new options for industry to utilize copper ores not considered economically feasible for processing in the past.

Recently published in journals including Hydro metallurgy, International Journal of Mineral Processing, and Minerals and Metallurgical Processing, Safarzadeh’s research was sponsored by one of the world’s largest gold companies, Newmont Mining Corporation, while he was a doctoral candidate. He is a faculty member in the Department of Materials & Metallurgical Engineering at Mines.

Safarzadeh was awarded the award for his dissertation research on extracting copper from ores containing high levels of arsenic with far less harmful environmental impacts and at lower costs than current industry practice. His work offers new options for industry to utilize copper ores not considered economically feasible for processing in the past.

The project aims to develop a mine ventilation design procedure that an operating mine could use to predict gas emission rates and adequate airflows. It will also allow for simulation of the caving process, analysis of the ventilation system, and validation of models through field measurements.

Purushotham Tukkaraja, PhD
The National Institute for Occupational Safety and Health has awarded South Dakota Mines $1.25 million to design more advanced underground ventilation systems in block caving mines. Principal investigator Purushotham Tukkaraja, PhD, assistant professor, will lead the five-year project to create safer and more comfortable working environments and potentially more efficient production for mining companies.

Block caving is an underground hard rock mining method that undermines an ore body, allowing it to progressively collapse under its own weight. It holds the potential to rival surface mining in rate and cost of mineral production.

Tyler Artz
Safarzadeh
Purushotham Tukkaraja, PhD
Alumnus Rob Mudge is among a select group of honorees named to the 2015 South Dakota Hall of Fame.

After earning two degrees from the School of Mines—a bachelor's degree in metallurgical engineering in 1976 and a master's degree in metallurgical engineering in 1978—Mudge co-founded RPM & Associates, Inc. in 1982, and now co-owns four Rapid City-based companies that manufacture specialty metal parts for power generation plants, mines, chemical plants, and aerospace firms.

RPM & Associates, RPM Solutions, and RPM Innovations currently employ approximately sixty people, 30 percent of whom are Mines graduates, as well as one intern.

RPM companies support SD Mines projects, including the SAE Formula Team, Mini-Baja Team, and the Engineers Make Great Entrepreneurs Program.

Among the numerous boards and civic positions on which Mudge has served: the School of Mines Foundation Board of Trustees and the Rapid City Economic Development Partnership. He and his wife, Debbie, fund an annual scholarship through the Foundation. Mudge was honored as a 2013 Distinguished Alumni. He will be inducted into the 2015 South Dakota Hall of Fame in September.

Conrad Farnsworth

Junior Conrad Farnsworth's company, Farnsworth Downs Technology, won first place in the student division of the 2015 Governor's Giant Vision business contest. The Newcastle, Wyoming, electrical engineering major was awarded $5,000 to continue developing small-scale liquid fluoride thorium molten salt reactors.

These small, portable, modular, and rugged power generators can be used in everything from water desalination to setting up emergency power in the event of a disaster or grid failure. These reactors will drastically reduce the cost of power and water purification while reducing nuclear waste drastically and potentially saving the military billions of dollars.

Module Innovations, founded by Mines graduate students, took third place in the business division for a color-changing strips that can detect E. coli and other harmful bacteria in food and water within minutes.

In 2014, faculty members Todd Merkleus and Hau Fong, both PhDs, took first with their company, Nanofiber Separations—which also was awarded a $709,849 Small Business Innovation Research award by the National Science Foundation—for their purification process that greatly enhances efficiencies and lowers the cost of pharmaceutical production. In 2013, alumna Matt Peabody's CalxAqua took home the top prize for his company, which provides an alternative for removal of arsenic and heavy metals from water.

Business Accelerator

With a $100,000 grant from The Blackstone Charitable Foundation in New York City, the university started an Engineering Accelerator Pilot Program with the Enterprise Institute to identify and assist high-growth potential engineering jobs in South Dakota.

Entrepreneurs-in-Residence

Within the past three years the School of Mines has aggressively built an Entrepreneurs-in-Residence program to drive technology to the marketplace. Fifteen entrepreneurs pair with a faculty researcher or team of researchers to develop new companies based on Mines technologies.

Shark Tank and Butterfield Cup

Buddling student entrepreneurs are also transforming their ingenuity into viable businesses through new programs such as the university's own version of “Shark Tank,” launched in December of 2014, and the two-year-old Butterfield Cup, in which entrepreneurs in computer science are working with angel investors to push their mobile apps into the marketplace.
Facilities
Goal: Redevelop and expand needed living, learning, and research spaces.

- Stephen D. Newlin Family Student Wellness & Recreation Center & Fraser Gym
  - Ground broken: May 2014
  - Project cost: $8.9 million

- Loop Road & 72-Vehicle Parking Lot
  - Project completed: November 2014
  - Project cost: $1.18 million

- Chemistry South Side Renovation
  - Project approved: March 2015
  - Project cost: $6 million

- Campus Utility Infrastructure
  - Construction began: May 2015
  - Project cost: $3.2 million

- University Assumes Management of Rocker I & II Student Apartments
  - Lease begins: Fall 2014

- Classroom Building Library Water Infiltration
  - Construction began: May 2015
  - Project cost: $319,615

- Harvey Fraser Gymnasium
  - Facility opened: April 2015
  - Dedication: July 2015
  - Project cost: $1.1 million

- Campus Utility Infrastructure
  - Construction began: May 2015
  - Project cost: $3.2 million

- Foundation Student Housing
  - Project Announced
  - Project approved: June 2015

- University Assumes Management of Rocker I & II Student Apartments
  - Lease begins: Fall 2014

- Foundation Student Housing
  - Project Announced
  - Project approved: June 2015

- Campus Utility Infrastructure
  - Construction began: May 2015
  - Project cost: $3.2 million

- Harvey Fraser Gymnasium
  - Facility opened: April 2015
  - Dedication: July 2015
  - Project cost: $1.1 million
Goal: Recruit, develop, and retain excellent faculty and staff.
Venkataramana Gadhamshetty, PhD, assistant professor in the Department of Civil & Environmental Engineering, was awarded the prestigious National Science Foundation (NSF) CAREER award that carries a $500,000 research grant.

Over the next five years, Gadhamshetty will conduct research that could pave the way for the next generation of minimally invasive, corrosion-resistant coatings for infrastructure. The annual cost of microbial corrosion on infrastructure on pipelines, appliances, and other structures is estimated to reach nearly $1 billion in the United States alone.

While there are several commercial protective coatings for metal protection, they tend to fail in the aqueous and microbial environments. Gadhamshetty’s research features graphene as a promising new protectant because it is 300 times stronger than steel, 1,000 times more conductive than silicon, and is optically transparent.

His research endeavors led him to be honored through the NSF’s prestigious Faculty Early Career Development (CAREER) Program, which supports junior faculty who exemplify the role of teacher-scholars who integrate outstanding research and excellent education.

Gadhamshetty joined the South Dakota Mines faculty ranks in the fall of 2014. He previously trained as an Excellence in Civil and Engineering Education Fellow with the American Society of Civil Engineers. He also received the Oakridge Institute of Science & Education Fellowship to conduct research at the Air Force Research Laboratory. He has previously taught at Florida Gulf Coast University and Rensselaer Polytechnic Institute in New York.
Administration
Goal: Responsibly steward financial and physical resources.
Revenues FY15

Unrestricted Revenues:
- Federal Grants & Contracts: $6,045
- State Grants & Contracts: $93,078
- Private Grants & Contracts: $400
- State Appropriations General Fund: $17,048,303
- Tuition & Fees: $23,832,202
- Auxiliary Sales & Services: $1,492,148
- General Sales & Services: $1,729,418
- Other: $2,338,670
Total: $46,540,264

Restricted Revenues:
- Federal Grants & Contracts: $13,132,614
- State Grants & Contracts: $2,511,474
- Private Grants & Contracts: $5,229,879
- State Appropriations General Fund: $0
- Tuition & Fees: $0
- Auxiliary Sales & Services: $7,041,062
- General Sales & Services: $652,544
- Other: $216,182
Total: $30,802,091

Unrestricted Expenditures:
- Instruction: $81,837
- Research: $18,088,490
- Public Service: $70,237
- Academic Support: $14,608
- Student Services: $3,591
- Physical Plant: $9,261,318
- Scholarships: $1,583,625
- Auxiliary: $5,983,505
Total: $35,436,649

Restricted Expenditures:
- Instruction: $20,643,050
- Research: $922,131
- Public Service: $349,438
- Academic Support: $70,237
- Student Services: $3,591
- Physical Plant: $9,261,318
- Scholarships: $1,583,625
- Auxiliary: $5,983,505
Total: $35,436,649

Unrestricted cash balance as of June 30, 2015: $1,321,868

Expenditures FY15

This information is presented on a cash basis and is unaudited.

Restricted expenditures exceed revenues as a result of bond proceeds for physical plant projects received in FY14 and expended in FY15.
University Advisory Board

Jim Green  
Retired  
Caterpillar, Inc.

Gwenne A. Henricks  
CTO & Vice President of  
Product Development &  
Global Technology  
Caterpillar, Inc.

Aelred J. Kurtenbach, PhD  
Co-founder  
Daktronics Inc.

Dana Dykhause  
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Todd James Kenner  
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Chief Technical Officer  
Peabody Energy

Rich A. Wells  
Vice President of Operations  
The Dow Chemical Company

Kip Larson  
Director of Product  
Technology  
Littelfuse

Laurie Chamberlin  
Former Strategic Sourcing  
Global Chemical Mgr  
Cargill, Inc.
Goal: Establish a robust culture of philanthropy to enable the university to sustain excellence.

Jim Kotas knows from experience the value of a college scholarship. Without one, he’s not sure he would have been able to attend the School of Mines and go on to enjoy a highly successful career with NASA and Lockheed Martin.

That’s why Kotas, recipient of a Surbeck Homer Scholarship, began giving back to the university almost as soon as he graduated with his electrical engineering degree in 1968.

“I had applied for several scholarships since our family was not financially well off and every dollar would be needed to obtain a degree without borrowing any money. I was very pleasantly surprised to receive a notification that I was being awarded a scholarship from Homer Surbeck. … So I felt a very personal connection every time I entered the Surbeck Center,” Kotas says.

Kotas worked for General Electric (GE) at Cape Kennedy on the Apollo Program and helped develop some of the first visual flight simulators for Navy and Air Force pilots, as well as for multiple commercial and international companies. He helped pave the way for the game and simulation technology available today on any laptop. After GE sold its aerospace department to Martin Marietta, which merged with other companies to become Lockheed Martin, Kotas eventually became director of Navy Programs before retiring.

He began giving back to the School of Mines just a year after graduating, and even though he is now retired from Lockheed Martin, GE still continues to match his donations to the Foundation. “Because of the early scholarship assistance I received, I knew firsthand the difference that can make, so I want to help offer the same opportunity to others,” he said.

Kotas demonstrates his leadership and support of the university in multiple ways. In 2006, he and other classmates established the Class of 1968 Scholarship, whose endowment now exceeds $125,000.
New Foundation President Joel Kincart has arrived on campus just in time to launch a capital campaign to strategically address funding university priorities over the next five years. Kincart talks about what the future holds for the Foundation and the South Dakota School of Mines & Technology.

Funding priorities have been identified in the areas of scholarships, student success, the Energy Resources Initiative, innovation, and music, and will address facilities, program, and staffing needs. Two consecutive five-year, $50 million capital campaigns are being considered, with a soft launch of the first already begun.

Q: There are a number of challenging priorities identified, but it's also very exciting.
A: That's why I came. There are clearly defined areas for which we need to raise funds. Raising $10 million a year for five years will be a significant challenge. Last year, we visited with fifty key alumni and friends to help identify the key areas of need and interest. We will also be structuring ourselves in a way that allows us to go out and see more of our alumni to tell this story, find out what people's passions are for the school.

Q: What is needed to establish a robust culture of philanthropy, as directed in the university's Strategic Plan?
A: It starts at home. About 30 percent of our faculty and staff make some sort of gift to the Annual Fund, and that is a significant number compared to other institutions. We have a goal of reaching 50 percent, and faculty and staff support is significant as we go into the community.

A second piece is having clearly articulated goals and priorities, and we already know what they are because of the Strategic Plan.

A third piece would be support from young alumni. Currently, between 3 percent and 4 percent of our graduates who have been out for fewer than ten years support the institution. If we can build a culture of philanthropy with young alumni as they are graduating—whether it is a $20 gift or a $50 gift being matched by the corporations for whom they work—then let's leverage that. But let's get our young alumni involved. It would be a new concept for the university. We have built our fundraising success from more established alumni, a more traditional donor base, the retirees, people further in life, but we need to think strategically about what young alumni do.

A fourth piece is building a robust donor base. Ten percent of our alumni give to us annually. Of our living alumni, half have made a gift at some point during their lifetime, so we will be looking at how we encourage alumni to support us annually. We also need to work with alumni to develop corporate support, donate to scholarships or endowments, and think about including Mines in their estate or their long-term plans.

Corporate giving alone is a significant piece of it. We have tremendous corporate support here because of the number of graduates we produce in key industries. However, there is opportunity because of what we do and the number of students employed by top companies to develop a value proposition about our role and how we can partner and leverage that together.

The final area is community support. Twenty-five percent of our alumni live in South Dakota, which I think runs contrary to what people's perceptions are. Fifty percent of our students come from out of state, but 20 percent of them stay. We are not only a part of the Rapid City community, we are a part of the South Dakota community, and we have to be more bold in sharing that message and building support from our community partners.

Q: What strengths set us apart, and what challenges do you anticipate?
A: Mines is an institution that takes students who are willing to demonstrate that they'll work hard, and they have an aptitude and passion. It's evident by the jobs they get when they leave here. You can measure the impact this institution has had on their lives. Fewer and fewer schools do that. In fundraising, there are a lot of causes to give to and a lot of ways to give. That wasn't always the case, and it puts higher education institutions in the position of being able to distinguish why giving to them matters. You can't just say, “Trust us. We're your alma mater. We'll do good things.” You have to be able to make a value proposition to your supporters and demonstrate the return on that investment. Mines can make that case.
## Giving by Year

**Sources:** Foundation and Hardrock Club

<table>
<thead>
<tr>
<th>Number of Donors</th>
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<tbody>
<tr>
<td>FY11</td>
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**Grand Total** $41.03M

## Foundation Net Assets

| FY11 | $50.53 |
| FY12 | $50.55 |
| FY13 | $57.99 |
| FY14 | $67.62 |
| FY15 | $68.77 |

2013 data excludes $49.3 million gift in-kind and 2015 data is preliminary.