

MECHANICAL ENGINEERING

Spring 2013

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ME Bids Farewell to Chuck Schilling



The Department of Mechanical Engineering will bid goodbye to one of its team members on June 21. After 24 years, Mr. Charles (Chuck) Schilling will retire as the department technician. With his departure, the department has hired two people to assume and expand upon the duties held by Chuck. Mr. Aaron Lalley has assumed the position of Laboratory Coordinator as an Instructor, and Mr. Jay Bestgen has filled the Laboratory Specialist position to work directly with the students in the manufacturing areas. Both Aaron and Jay come to the depart-

ment with varied backgrounds and experience. We are proud to say they are both graduates of our department here at SDSM&T.

Chuck has had many life experiences in the service to his country, community, and the school. While in high school, he worked as a restaurant short order cook and in the landscaping business. He attended the University of the South in Sewanee, TN. Later, he attended Broward Junior College while working as a tin smith. He joined the military during the Vietnam conflict and was assigned to the Minuteman intercontinental nuclear ballistic missile system. He gained experience in several technical areas, including electronic systems repair and life-size simulator systems programming and repair. His teaching and administrative experience also began in the military as a maintenance instructor and manager of fifteen nuclear missile launch control facilities. His last duty assignment was Chief of the 44th Strategic Missile Wing Launch Control Facility Division, where he had the honor to serve on the Battle Staff. Chuck retired from the military in June 1989 as a Senior Master Sergeant after twenty-three years of honorable service. From 1980 to 2000, he served on the Rapid Valley Volunteer Fire Department, where he fought structure and wild land fires. He retired from the Pennington County Fire Service as a Captain and South Dakota State Fire Instructor.

Chuck's career at Mines started in August 1989. The late professor Bill Groves gave him the chance of a lifetime. Over twenty-three years, he has been able to live and work in what became his dream job. As the department's technician, he was able to work with some of the world's smartest individuals, from students to professors. He machined and welded parts for projects that helped mankind, from the health profession to outer space. Chuck designed and built teaching aids for the department's labs. His greatest reward was seeing so many young people graduate, acquire responsible positions in industry, raise families, and become outstanding contributors in their fields. He once commented to a student, "When your children attend this university, it will be time to retire." Well, that has happened many times over, and now is the time to keep his word. To all the people that have been a part of a most rewarding career, he does not say goodbye, but farewell. "May our paths cross again in the future!" He is off to start another twenty-three year career in another rewarding field. We are certainly going to miss him!

Faculty and Staff Additions



Mr. Jay Bestgen, originally from Sturgis, SD, graduated from SDSM&T with a BS in ME in 2008. He worked as a maintenance engineer for Peabody Energy in Gillette, WY, from 2008 to 2010. His main focus was in project planning and management, developing budgets, and designing projects to help improve safety and production for Caballo Mine. Jay went on a deployment to Afghanistan for Operation Enduring Freedom with the South Dakota National Guard from 2011 to 2012. He worked for Bobcat Company at the beginning of 2013 in Bismarck, ND, as a design engineer on the mini excavator team. His main focus there was creating and maintaining engineered designs of assigned products, systems, and components on the mini excavators to be competitive in marketability, manufacturability, and function. In his free time, Jay enjoys hunting, fishing, and spending time with family and friends.



Dr. Cassandra Kingsbury, originally from Rapid City, SD, received her BS degree in metallurgical engineering from the South Dakota School of Mines and Technology in 2007. She received her PhD in materials science and engineering in 2012 from the University of Illinois at Urbana-Champaign, studying mechanochemical reactions of a spiropyran mechanophore in polymeric materials under shear loading. She joined the mechanical engineering department at SDSM&T as an assistant professor in August 2012. Her current research interests include novel manufacturing and characterization techniques of polymer and composite structures and the incorporation of multifunctionality by inducing desired responses to mechanical loading.



Mr. Aaron Lalley, originally of Sioux Falls, SD, graduated from SDSM&T with a BS in ME in 1991 and an MS in ME in 1993, with research focused in real time strain monitoring for fatigue failure predication. He continued graduate research with Colorado State University through distance education, while working as an engineer from 1998 to 2010 with research focused in material processing and modeling. He transferred his graduate work to SDSM&T in 2010 and is currently working with characterization and control of machining chatter.

Aaron's engineering work history includes 18 years with Hutchinson Technology as an engineer in manufacturing, machine design, and tool design, working in the process areas of laser welding, shearing, forming and coining. In addition to Hutchinson Technology, Aaron has worked for Caterpillar, Midwest Precision Tool and Die, Unified Theory Inc., and Manufacturing Works an agency of the State of Wyoming, in the areas of machine design, product design, CNC programming, HVAC, MRP, process development, and product development.

Mr. Jason Ash Recognized for Ten Years of Service to the ME Department



Mr. Jason Ash (ME99, MSME01) was recognized for ten years of service as a mechanical engineering instructor at the Employee Service and Recognition reception held on May 1, 2013. Throughout this time-frame, Mr. Ash has taught courses in freshman engineering, dynamics, solid mechanics, machine design, and senior capstone design. He also serves as the advisor to the ASME student section and the Students for the Exploration and Development of Space (SEDS) for which he was awarded a 2011-2012 NASA South Dakota Space Grant Consortium Project Innovation Grant to reform SEDS. Additionally, Mr. Ash was appointed by the district leader, Mr. Thomas Wendt, as the ASME District C Student District Operating Board (SDOB) advisor and as the ASME Student Sections Committee (SSC) Senior Representative for District C.

Alongside his mechanical engineering instructor position, Mr. Ash is nearing completion of his PhD in materials engineering and science. His doctoral research emphasis has been on the interfacial mechanics of composite materials under the guidance of major professor, Dr. Lidvin Kjerengtroen. A paper entitled, "Estimation of the true interfacial shear strength for composite materials with the microbond test," is under peer-review for presenting at the upcoming ASME International Mechanical Engineering Congress and Exposition to be held in San Diego, CA, this coming November 2013. The abstract was previously accepted for the conference, and the paper summarizes failure analysis contributions made to the microbond test literature. Mr. Ash's will graduate in August 2013 after completing revisions to his dissertation.

ASME Activities



(Above) 2012 ASME IMECE SSC/SDOB Committee District C Representatives, L to R: Carlos Beatty, Jr. (IENG13), Jason Ash (ME99), Carissa Petzinger (Marquette University), Wesley Haug (Southern Illinois University – Edwardsville), Merya Zgheib (District J, Lebanon). (Not shown: Colin McGowan [ME junior/SDOB chair]).

(Below) Megan Frager (ASME chair) demonstrates LEGO Mindstorm Rubik's Cube solver at a 4th grade outreach activity.



Outstanding Graduate (2nd Place), Joshua Hammell



Josh Hammell is in his fourth year of PhD research in the mechanical engineering program at SDSM&T. For his academic success, Josh was awarded 2nd place Outstanding PhD Graduate Student at the 2013 Honors Convocation.

In Fall 2008, Josh joined the Laser Powder Deposition (LPD) research team under Dr. Langerman's guidance. Additionally, in Spring 2009, he began conducting research under the mentorship of Dr. James Sears in the Additive Manufacturing Laboratory (AML). Over the past five years of combined research study, Josh has demonstrated his commitment to intellectual inquiry and was featured in the 2013 SDSM&T Research Report for his contributions to the state-of-the-art in laser additive manufacturing. In Summer 2012, Dr. Sears stepped down from

his position as director of AML. With the absence of Dr. Sears, Josh is currently overseeing more than half a dozen projects with various industrial partners. These projects bring in funding to help support his research, and that of other students working in the AML. He is also overseeing experimental LPD research, which has led to one peer-reviewed publication and one that was submitted for review in Spring 2013. This research is also the basis for his PhD dissertation, which is focused on radiometric analysis of LPD components.

Over the past five years, Josh has mentored and helped support three graduate students and seven undergraduate students while conducting AML and LPD research. He has also served on several Search and Screen Committees formed to fill important vacancies in the ME department. In addition, he has participated in meetings of the Mechanical Engineering Industrial Advisory Board, including a presentation on thermal imaging diagnostics of LPD. He has also coordinated several demonstrations in the AML for Engineering Week, Youth Engineering Adventure (YEA), and countless department tours. Josh has also participated in department public relations photo shoots and meetings. Without question, he will continue to be a superb student and an asset to those he works with. After graduation, he plans to start his own laser processing facility, and will continue to be a great ambassador for this institution.

Outstanding Recent Graduate (Dana Sander)

Dana started his oilfield experience as an apprentice electrician in the Baker, MT, oilfields during high school and college. After graduating from SDSM&T in Rapid City, SD, he started his engineering career with a small startup company called Safety Suites Inc., where he designed, promoted, and developed a patented portable horse corral system. He changed career paths for four years to join the Bobcat Company as a Test Engineer, where he was promoted to a Test Engineering Manager over the Czech Republic Test Engineering Department and Bobcat Hydraulics Test Engineering Division. The oilfields called him back to his roots with an opportunity to work near the mountains for Baker Hughes Centrilift in Cody, WY, as an account manager. His test engineering and management experience, coupled with the success as an account manager, allowed him to be promoted as the manager of a satellite facility in Baker, MT. Although he was very successful with the challenging applications in the Bakken unconventional play and horizontally completed gassy wells, the mountains and engineering called him back to Cody, WY. In the Technical Manager role, he has earned a reputation for providing engineering solutions to the most challenging technical issues in the region. He continues to seek and understand the latest technical developments and is quick to implement new methods, procedures, and techniques. He has been developing multiple innovative gas handling VSD Software solutions that have led to SPE presentations and recognition within the industry. He works hard as an employee at BHI but really enjoys his time with his amazing wife and three young toddlers while exploring God's creation in the mountains surrounding Cody, WY.



Outstanding ME Junior and Senior



Carly Sandin was recognized at the 2013 Honors Convocation as this year's Outstanding Junior in the mechanical engineering department. From Greeley, CO, Carly started at SDSM&T in Fall 2010 with an interest in space exploration and development. Last summer, she interned at NASA Johnson Space Center, and, for the summer of 2013, she has accepted an internship at Boeing. She plans to continue her education in graduate school and hopes to work for NASA or in aerospace industry when she graduates.

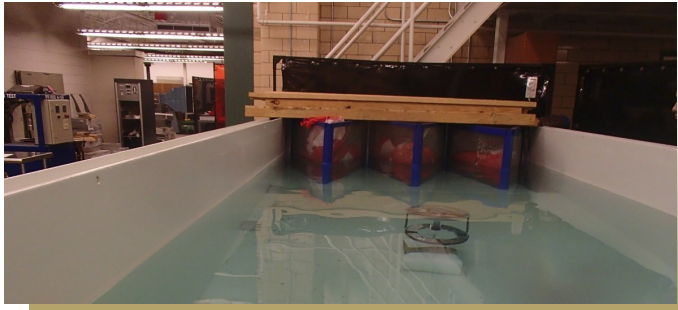


Luke Pucket was awarded this year's Outstanding Senior in the mechanical engineering department at the 2013 Honors Convocation. From Hot Springs, SD, Luke began his educational career at SDSM&T in Fall 2009. After graduating in December 2013, Luke plans to obtain a job in engineering design and prototyping.

Remember Your Alumni Association

The South Dakota School of Mines and Technology Alumni Association promotes communication and interaction among alumni, students, faculty, and administrators of the South Dakota School of Mines and Technology, with the objective of strengthening the school's academic, research, and service roles. Whether through the *Hardrock* or the *Hardrock E-News*, area meetings or reunions, the Alumni Directory or award programs, they are here to help you and to help our alma mater. So please consider supporting your Alumni Association with your contributions and your time. Learn more via <http://alumni.sdsmt.edu>.

SDSM&T Wave Tank (Dr. Umesh Korde, Professor)



The ME department recently funded and installed a wave tank in the Integrated Laboratory to support our research on wave energy conversion. The tank is 17 ft long, 7 ft wide, and 4 ft deep, and is made of steel. Seven wave makers working on the 'oscillating water column' principle are to be installed at one end of the tank. The first of the wave maker units is already operational and can be programmed to produce

both harmonic and irregular waves. A wave-absorbing 'beach' is provided at the opposite end to ensure a stable and repeatable wave pattern while wave energy converter scale models are being tested in the tank. This tank will enable an intermediate-scale validation of analytical and computational work on wave energy device control and optimization prior to near-full-scale tests on larger wave basins and full-scale tests in the Great Lakes or in the oceans off the Atlantic or Pacific coasts.

The department is indebted to Mr. Charles Schilling for his hard work and thoughtful supervision of the design, construction, and operational testing of the tank. Much appreciation goes to recent ME Senior Design teams [Stephen Vought (ME12), Eric Persinger (ME12), Aaron Sevigny (ECE12); and Ryan Taylor (ME13), Grady Perrine (ME13), and Cody Vostad (ME13)] for their creative ideas and long hours in the Machine Shop. We thank TrueNorth Steel for their fine workmanship and excellent service, as well as for the donation of the steel for the beach. Thanks also go to the Civil Engineering Steel Bridge team for their work on the beach and to Pete Lien and Sons for donating the supplies for the beach.

Women's Mentoring Program/SWE conference (Lisa Carlson)

Mechanical Engineering is not traditionally a field that piques large female interest, and is also a hard field to retain women. SDSM&T's mechanical engineering department was seeing low recruitment and retention rates among its women students, and, therefore, started a new initiative this year with the creation of a women's mentoring program that pairs entering freshmen with upper-class juniors and seniors.

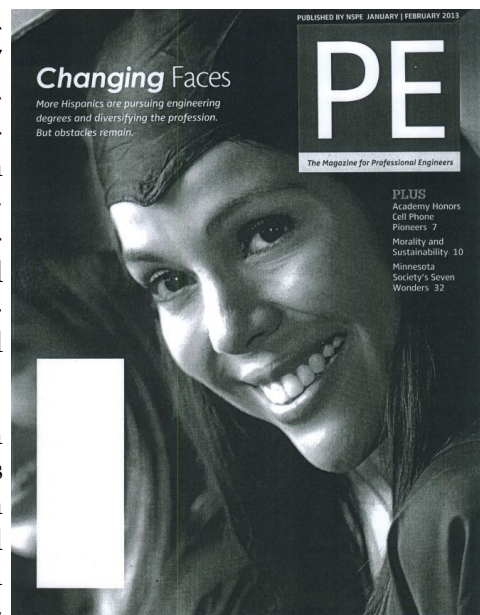
The program, along with informal mentoring between the women pairs and professional development, was able to take six women—one freshman, one sophomore, two juniors, and two seniors—to the annual Society of Women Engineers conference in Houston last November. Inclusion in the conference was a wonderful opportunity for our selected women students to participate in seminars, network with peers, and visit a career fair attended by over 250 companies. Additionally, the SDSM&T group paired with Jason Ash and some fellow ME students who were attending a nearby ASME conference to tour Toshiba and NASA's Johnson Space Center. There, the groups were able to secure a behind-the-scenes tour including viewing Robonauts, the Saturn V shuttle, and the Mission Control room. This trip was such a learning experience for the students, and the industrial tours such a highlight, that they were inspired to attend next year and help raise additional funding for more students to attend.



Recruiting Numbers (Lisa Carlson)

The department's Fall 2012 enrollment numbers were unprecedented for the second year in a row. In Fall 2011, there were 437 undergraduate students in the Department of Mechanical Engineering. By Fall 2012, those numbers had increased to 514 students. Likewise, our women student population also increased. In Fall 2011, we had 27 women students. The number of women increased to 43 by Fall 2012. Retention numbers have also remained high. From Fall 2012 to Spring 2013, we have retained 95% of our women students, and the overall undergraduate retention was 93%. Additionally, our first-time retention from Fall 2012 to Spring 2013 is at 96%.

The program's recruitment efforts made national headlines with its revolutionary marketing tactics and newly-minted women's mentoring program. A Rapid City Journal article ran a story on the mentoring program, which was picked up by the Associated Press, reaching as far as Florida. Later, PE Magazine featured an article in its January/February issue about the department's efforts.



Women in Science and Engineering Program



In addition to her recruitment and retention duties for the department, Lisa Carlson was asked this year to resurrect the dormant Women in Science and Engineering (WiSE) program. Formerly run by Royia Hrnir, the program fell inactive after she resigned from her position. The program was re-launched in the Spring 2013 semester, beginning with a soft re-launch in January. The program kicked off its campus-wide launch in March, piggybacking on Women's History Month, with the first annual Women in Science and Engineering Symposium. This event sought to outreach with high school young women, as well as science and math teachers, while providing professional development through industry speakers, who were all SDSM&T alumni. Over 40 high school students and 20 Mines women, from all different disciplines, attended the Symposium. The event concluded with a semi-formal dinner, attended by symposium participants and Mines faculty and staff, and the keynote speaker was Dr. Kathy Johnson, President, South Dakota

Board of Regents.

Ms. Carlson has extensive plans to grow the program into a robust recruitment and retention mechanism, which will incorporate service activities, K-12 outreach, networking opportunities, and monthly professional development programs.





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ME Department Head's Message



Dear ME Alumni and Friends,

I am going to dedicate this letter to a good friend and colleague of mine and all of us here in the department, but first a brief update. Once again, our undergraduate enrollment has reached a record level. Our enrollment in the fall semester was 514 students, up about 18% from the previous year. This increase is a result of aggressive recruitment activities led by Lisa Carlson, the department Director of Recruitment and Graduate Programs, in collaboration with university admissions staff. Even more impressive is that our women enrollment is at a record level increasing almost 60% over a year ago.

Over this past academic year we conducted four faculty searches. Cassandra Kingsbury (MSME07, PhDME12) was hired as an assistant professor within the mechanics group. Aaron Lalley (ME91, MSME93) was hired as a department instructor and Lab Coordinator. Aaron came on board in February and has already proven his worth with recommendations for lab updates. Dr. Albert Romkes has been hired into the mechanics group as an assistant professor and will report to campus this coming August. Dr. Ali Heydari has been hired into the controls group as an assistant professor and will also report to campus this coming August.

June 21, 2013 will be looked upon with ambivalence. It will be a sad day for the department as it will be the day Chuck retires after 24 years as the department's technician. His dedication and commitment to the department faculty, staff, and students is a major reason for our success over the years. He has seen the department grow from 280 students in the early 90s to over 500 students today, and I should add that his student commitment reached across campus. Students from all disciplines, engineering or science, came to Chuck when they needed something machined or repaired or to just talk about a girlfriend or boyfriend problem. He wore several hats. It will be a happy day for the department because we realize Chuck has earned some downtime and R&R. I said "some downtime" because I am pretty sure he won't be able to stay away entirely; in fact, he's indicated as much.

Jay Bestgen (ME08) has been hired as Chuck's replacement. He's got big shoes to fill, but I know Jay is up to the task, and we look forward to a productive relationship with Jay in the future ahead.

Finally, I want to remind anyone who may have an interest to serve on our department Industrial Advisory Board (IAB) to contact us. We have four new members: Randy Clarksean (ME83), Tim Holleman (ME71), Mike Wood (ME03), and Mike Rizer (ME90). On behalf of the department, I want to thank these new board members for their willingness to serve the department and to the current members for their continued service.

P.S. Please remember to support your alumni association. Go Hardrockers!

Michael Langerman
 Professor and Department Head
 Mechanical Engineering Department
 SDSM&T