

Exploring Materials

at Virginia Tech

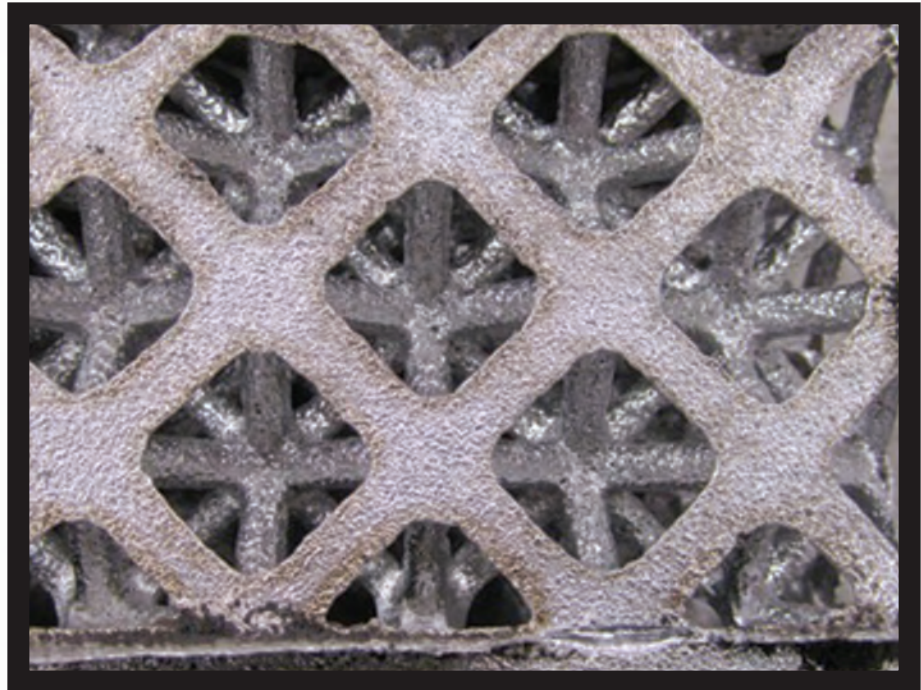


Fall 2013, Volume 15, Number 1

News from the Department of Materials Science and Engineering
Virginia Polytechnic Institute and State University

Spotlight

Research



Cast cellular structure produced using a 3D printed sand mold

Metal Casting and Metallurgy Research at VT-FIRE

Alan Druschitz

The research interests of Dr. Druschitz include metal casting processes, ferrous and non-ferrous alloy development, ballistic/armor materials, heat treating, welding, materials and component testing, non-destructive testing, failure analysis, corrosion, residual stresses, and occupational safety. At Virginia Tech, he currently has ongoing projects on nearly all of these subjects. Contrary to previous projects, all of his research at Virginia Tech is multi-disciplinary; Dr. Druschitz is working with researchers in Mechanical Engineering, Engineering Science and Mechanics, Sustainable Biomaterials, Occupational Safety, and industry.

The combination of resources available at Virginia Tech plus the new Kroehling Advanced Materials Foundry provides the opportunity to perform cutting edge research in metal casting processes, alloy development, development of ballistic/armor materials, heat treating, materials testing, and corrosion. His projects include the use of 3D printed sand molds for producing cast cellular structures

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Research Corner

Meet Professor Alan Druschitz *by LeeAnn Ellis*



When construction started on the Kroehling Advanced Materials Foundry at Virginia Tech, the search began for a director of the foundry and VT-FIRE. Someone with industry and foundry experience was essential, and Dr. Alan Druschitz fit the bill perfectly. He joined the MSE faculty in January 2011, just in time for the inaugural semester of classes at the foundry.

As a boy growing up just outside Chicago, the themes of industry and engineering filled his house. His mother was an industrial nurse and his father was a mechanical engineer. An early hobby of building and flying model airplanes and gliders served as a starting point for his love of hands-on, practical engineering.

In the mid-1970s, Alan entered Illinois Institute of Technology (IIT) in Chicago, which happened to be his father's alma mater. Although he started out in chemical engineering, he transferred into metallurgical engineering his sophomore year because he was so impressed with the professor who taught the required materials course. That professor was Dr. Paul Gordon, who had worked as a group leader on the Manhattan Project. Alan points out that all of the professors at IIT had worked in industry and were very good in practical matters. Because IIT was located so close to steel manufacturing, the small metallurgical engineering class of seven was well trained in steel mill metallurgy.

Dr. Gordon later became his thesis advisor, and when Alan was completing his Ph.D. in the early 1980's, a major recession

was underway. He was fortunate that General Motors had just begun hiring Ph.D. graduates for their research laboratories, where the company philosophy was changing to fit with increasing advances in technology. "At General Motors, I had a chance to do a little bit of everything." He worked in metals, stamping, forging, casting, welding, advanced ceramics, intermetallics, and armor. With his practical education at IIT, he was well-suited to assist the various manufacturing divisions with problem solving.

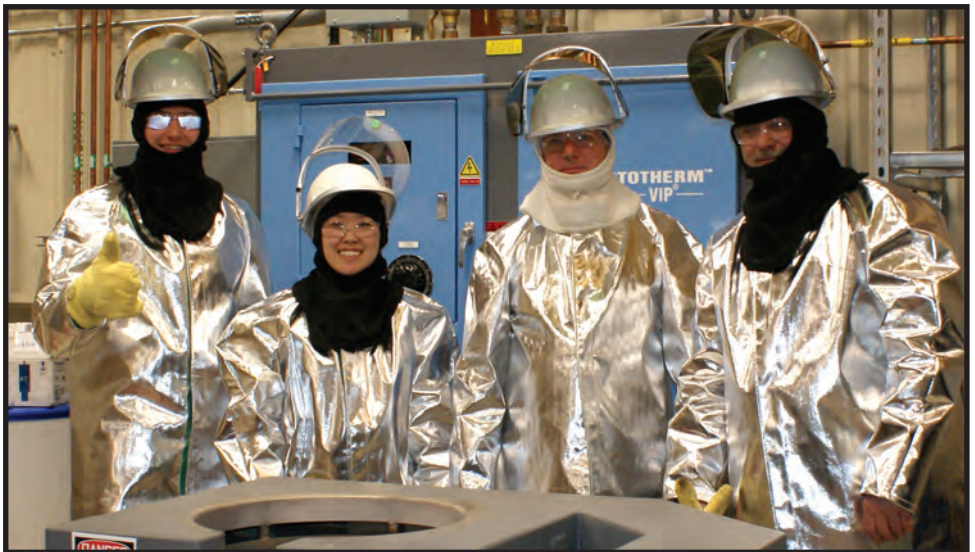
Alan's first exposure to serious foundry work and casting came when he was asked to spend six months in Defiance, Ohio, at GM's Casting Operations plant studying a particular problem and developing guidelines to prevent the problem from reoccurring. "I just fell in love with the foundry at that point." It is still one of the largest foundry operations in North America. "When I was there, they were melting 600 tons of iron an hour," Druschitz said. "A lot of plants don't melt that in a year."

Professor Druschitz spent eight of his fourteen years at GM working in castings. Attached to his résumé is a long list of accomplishments, and he points to one in particular, "Improved durability and reduced cost of welded trailing axles," as his most memorable achievement. "I am an expert in twist axles," he says with a smile, "which can be a really bad mechanical engineering idea." These axles may self-destruct if not designed properly. He visited the plant, studied the problem, and fixed

it, to the amazement of everyone at the plant. The research people were usually very theoretical, but thanks to his practical background, Alan was able to discover the welding and materials problems and find solutions.

In 1996, he accepted a position with Internet Corporation in Lynchburg, Virginia, a company that manufactured castings for the automotive industry. Although he had not planned on leaving General Motors, he found the idea of working fulltime in castings interesting. "The nice thing about Internet was there was very little corporate structure. Everyone knew everyone. So when there was a problem at a plant, it was a phone call," and assistance was quick. Quite different from the intricate hierarchy he experienced at GM, where it once took three days for word to descend through the ranks that his help was needed at a plant only 20 minutes from his home. Working with Internet expanded his exposure to the automotive industry. Instead of working with just GM, he now worked with Ford, Chrysler, Toyota, Honda, and many others.

An inevitable downturn in the automotive industry in 2007 signaled it was time for yet another change for Alan. Based on the fact that all of his IIT professors had come from industry, he always planned on going into teaching after 10 to 20 years in industry. "I knew about Virginia Tech and VT-FIRE and Paul Huffman." But the foundry was still in the planning stages. So he accepted a position at the University of Alabama at Birmingham to

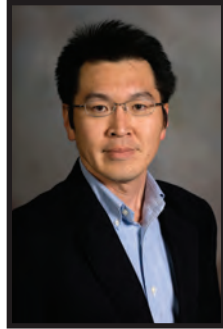


Left to Right, Two students from the first metal casting course, Alan Druschitz, Steve Bickley

MSE Associate Professor Mitsu Murayama Receives 3M Nontenured Faculty Award

take over the casting program in October 2007, where he served as a research professor, mainly writing proposals and only teaching one class per year. During his three years at UAB, he saw the expansion of the casting facility from a small section in the engineering building into a warehouse with the addition of new equipment. More plans for expansion and growth were in the works when he got a call from Paul Huffman saying, "At Virginia Tech we've got this brand new foundry. We'd like someone with industry experience. Would you like to move back to Virginia? Send in your résumé!"

Both Alan and his wife, Lori, whom he met and married back in graduate school, were happy to return to Virginia. Alan wanted to do more teaching, so that was a definite attraction to this new position at Virginia Tech. As soon as he arrived in January 2011, Druschitz jumped right into the classroom with an MSE course in metal casting and an AOE course in materials and manufacturing. By the spring of 2013, more courses had been added, and Druschitz wrote in his annual activity report, "We have growing enthusiastic student participation in metallurgy and metal casting activities, both on campus at VT-FIRE and off campus. At least eight students (four female) pursued careers in the metal casting industry and two won national competitive scholarships." Under Professor Druschitz' leadership, Virginia Tech received Foundry Educational Foundation (FEF) Certified status in 2012, placing the university among only nineteen FEF-certified schools in the United States. This certification entitles the recipients to additional funding for scholarships and operating supplies. *



Associate Professor Mitsuhiro (Mitsu) Murayama received a 3M Nontenured Faculty Award for his work in three-dimensional transmission electron microscopy. This award, previously known as the Non-tenured Faculty Grant (NTFG), is highly competitive and was created more than 25 years ago by the 3M Technical Community in partnership with the 3M Community Giving Program, in order to invest in individuals who will lead university teaching and research. The awards provide \$15,000 per year until tenure is achieved, up to a maximum of three years, in unrestricted financial support. The aim of the program is to help promising faculty earn tenure and contribute to their academic fields. Murayama's accomplishments include supervising the transmission electron microscopy part of the Virginia Tech Nanoscale Characterization and Fabrication Laboratory and teaching introductory level electron microscopy, electron diffraction, and electron-based spectroscopy as well as practical transmission electron microscopy approaches to the more experienced. *

MSE Associate Professor Kathy Lu Spends Two Semesters in Darmstadt

Associate Professor Kathy Lu received The Friedrich Wilhelm Bessel Research Award from the Alexander von Humboldt Foundation in Germany. This award is given to scientists and scholars internationally renowned in their fields, and they are invited to spend up to one year cooperating on a long-term research project with specialist colleagues in Germany.

From August 2012 to May 2013, Prof. Lu worked at Technische Universität Darmstadt with Prof. Ralf Riedel, whose expertise is in polymer-derived ceramics. She collaborated on research in conductive coatings for solid oxide fuel cells, patterning work for polymer-derived ceramics, and new materials for super capacitors. In addition to her research, Professor Lu attended conferences and also presented a department seminar entitled "Material Uses and Challenges in Solid Oxide Fuel Cells."

In comparing TU Darmstadt to Virginia Tech, Professor Lu said, "Our students are under a lot more pressure." For example, there are no qualifying or preliminary exams and few classes for doctoral students in Germany. However, all entering Ph.D.

candidates must have a Master's degree.

"I was surprised that 90% of their undergraduates go into Master's studies, and often Master's students are not financially supported, while their Ph.D. students are." There is a higher ratio of domestic graduate students, mainly because Germany prefers advanced degrees. Professor Lu also points out that tuition is free for college students up through the doctorate level. Students must cover their own living expenses, and all students live off-campus. There are no dormitories.

Professor Lu and her family took advantage of free time to travel around Europe visiting Paris, Rome, Venice, Brussels, Amsterdam, as well as Berlin, Frankfurt, and Stuttgart. The family favorite was Venice—no cars! She describes her 11-year-old daughter, Maggie, as the best-adapted of the

family. She is now fluent in speaking and writing German, and she made many new friends. The family lived in Griesheim, where Maggie was allowed to ride the tram to the town center and to visit her friends on her own, due to the safe environment in the small towns of Germany. *

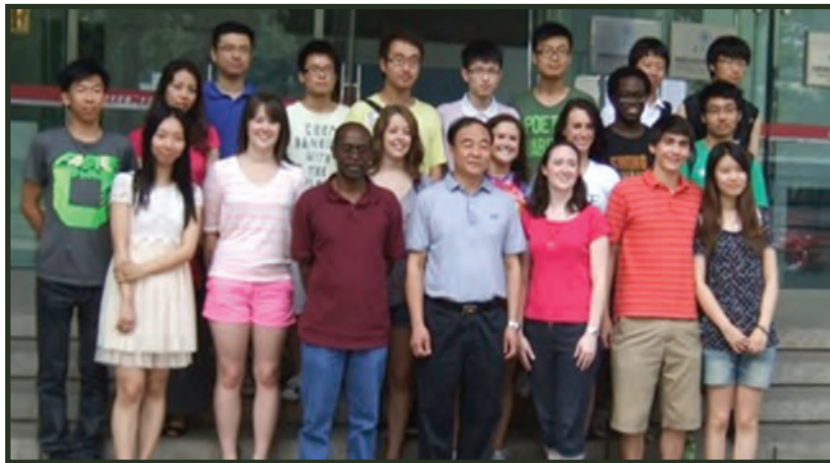


Prof. Lu beside the Alexander von Humboldt statue in Berlin

Department News

The 2012 – 2013 Tianjin University – Virginia Tech Cultural Exchange Program

by Abby R. Whittington



MSE Faculty and Students in Tianjin

In May 2012, five undergraduate students and two faculty spent three weeks with the Materials Science and Engineering department of Tianjin University in Tianjin, China. The attendees were: MSE Professors Alex Aning and Abby Whittington, MSE students Charles Forman, Carli Kitto, Meaghan Merrill, Gabriella Mirabelli, and Nicole Mottes. Highlights of their trip included attending Chinese Cultural and Language classes, visiting local material companies, and a three-day trip to various cultural venues in and around Beijing, China.

Both Professors Aning and Whittington presented short courses in metallurgy and biomaterials, respectively. The two-week courses allowed the TJU MSE students a chance to experience technical courses in English. Prof. Whittington found that afternoon sessions spent discussing the technical language brought out a better understanding of the material and led the group to a fantastic debate on biomaterial ethics.

Places the group visited included: The Great Wall, The Forbidden City, and Tiananmen Square. While in these places, our group was often the object of much interest. As said by Gabriella, “[The Chinese] were absolutely amazed at the sight of a person of different ethnicity, to the point where random people will stop

you in the streets and demand a picture with you.” While walking around the Beijing Opera House, two boys followed our diverse group. When Dr. Aning’s son, Aja, spoke to them in Mandarin, the bolder of the two jumped off of his bicycle, hugged Aja around the neck, exclaiming, “You speak my language! You are my brother.”

The group enjoyed fantastic new foods, great shopping, and the formation of new friendships. Overall, each person felt the warmth and acceptance of people from a completely different background pointing out the differences and similarities. From a birthday party organized for one of our students to a tour of the Tianjin Art Museum, each student felt a part of the trip had been planned with them in mind.

“No matter how uncomfortable I might have felt in certain instances, I learned how important it is to always treat people of other cultures with tolerance and respect.” – Carli Kitto

In February 2013, ten students and two faculty visited Virginia Tech from Tianjin University for three weeks. Their time included attending MSE classes, meeting with various faculty and student groups, and tours of the NCFL, Kroehling Foundry, and Ware Laboratory. By

far the most popular were the visits to the MSE classes according to our visitors. They were also impressed with the beauty of the New River Valley.

“VT provides a comfortable environment to study and live: the people are friendly, the view is beautiful and the facilities are modern. The experience also let me determine what to do in the future.” – Weizhe “Carl” Wang

At the end of both trips, the students were asked to complete a short essay on what impressed them the most about their trip and how this will assist them in their future as they become Materials Engineers. Both groups appreciated the different learning environments and the variety of interactions the cultural exchange allowed.

This cultural exchange is a wonderful experience for VT and TJU MSE students. As these shared experiences continue, a greater global understanding can be built and the students will begin to appreciate the similarities between our two countries. ✨

VT-FIRE Takes Part in Virginia Tech Summer Programs



VT-FIRE Director, Alan Druschitz, was one of four VT faculty leading a project through the 2013 summer Sciencering program. Two undergraduate students hoped to discover the historic secret used in manufacturing Damascus steel. Pictured above, Beck Giesy, a sophomore in mathematics (left), and Veronica Kimmerly, a senior in chemical engineering, hammer steel in the Kroehling Foundry on an anvil designed and cast at the foundry.



Dr. Druschitz also participated in the 2013 Research Experience for Teachers program, sponsored by the Center for Innovation-based Manufacturing. He worked with two area teachers, Rupert Cox, who teaches algebra at Blacksburg Middle School, and John Franklin, who teaches Technology Education at Christiansburg High School and Eastern Montgomery High School. This five-week program provides opportunities for middle and high school STEM teachers to participate in research in the area of advanced manufacturing. Pictured above, Rupert (left) and John work in the corrosion lab in Holden Hall. *

AFS Piedmont Chapter Annual "VT-FIRE" meeting



The AFS Piedmont Chapter held its annual "VT-FIRE" meeting at the Holiday Inn in Blacksburg on January 23 and 24. Students from MSE and ME gave presentations highlighting their work at the Kroehling Foundry. Three recent MSE graduates, Jacob Young, Adam Humphreys, and Peter Kim, discussed working in the metal casting industry and the value of experiences gained at the foundry. MSE senior, Mary Seals, talked about the value of internships. As a whole, these presentations offered an impressive portrait of the positive impact of VT-FIRE and the Kroehling Advanced Materials Foundry.

During dinner Wednesday evening, a total of \$10,500 was awarded in scholarships to 10 students. The AFS Piedmont Chapter presented scholarships to Devon Baker (MSE junior), Shawn McKinney (MSE senior), and Drew Snelling (ME grad student). Precision Castparts Corporation awarded scholarships to MSE students Haley Cherniuk (senior), Myrissa Maxfield (sophomore), and Mary Seals (senior). FEF Foundry Educational Foundation scholarships were presented to Ruth Kay, Patrick Stockhausen, and Patrick Walsh, seniors in MSE.*

MSE Faculty and Students Attend FEF College Industry Conference



The Foundry Educational Foundation (FEF) held its annual College Industry Conference (CIC) in Chicago this year. Four student delegates from MSE attended, along with the FEF Key Professor, Alan Druschitz. This conference brings together students, professors, and metal casting leaders from across the U.S. FEF Certified and Affiliated schools received \$44,500 in special scholarships. Virginia Tech is one of only 19 universities worldwide to be FEF Certified. VT students won 2 of the 20 scholarships awarded. Mary Seals received the Ronald and Glenn Birtwistle Scholarship, and Shawn McKinney received the Modern Casting Partners Scholarship. *

AFS-Piedmont Pledges Continued Support for VT-FIRE

June 27, 2013 - Paul Huffman and Greg Southerland, representatives of the American Foundry Society - Piedmont Chapter, presented a \$24,000 check to COE Dean Benson as a first installment of their new \$40,000 pledge in support of VT-FIRE and the foundry at Virginia Tech. The AFS-Piedmont Chapter initially kicked off the VT-FIRE project back when the foundry was still in the planning stages with a \$45,000 pledge, which was fulfilled in 2012. Pictured below, left to right: Greg Southerland, AFS-Piedmont Chair; Dean Richard Benson; Paul Huffman, AFS-Piedmont Education Chair. *



Education Corner

MSE Senior, Kelly Ramsburg, Shares VT Experiences with Future Engineering Students



Kelly Ramsburg received the Dean's Scholar Scholarship as an entering freshman. It is one of two of the largest, most competitive, and most prestigious scholarships offered by the College of Engineering. As a Dean's Scholar and graduating senior, Kelly was invited to address the 2013 awardees at a banquet held April 7, 2013, sharing her experiences at Virginia Tech, in the College of Engineering, and in the MSE department. Presented here are excerpts from her speech. In 2011, Kelly won a Science, Mathematics, and Research for Transformation (SMART) Award. SMART, a nationwide scholarship program through the Department of Defense, provided Kelly with full tuition, a yearly stipend, and guaranteed employment after graduation. Following graduation, she will work in the Air Force Research Lab designing advanced materials and figuring out how to implement them in Air Force systems.

When making my college decision, I wanted that “big school atmosphere,” the screaming crowd packing the stadium at football games, the hundreds of clubs and activities available to students, and the world renowned academics. I wanted a school with a top-notch engineering program and a commitment to cutting edge research. I also wanted to remain within driving distance of my home in Maryland.

Virginia Tech was my top choice. When I found out that Tech's engineering program requires every student to spend a semester in General Engineering to explore different majors, I was pretty much sold. Unfortunately, I was out of state, and Maryland was significantly more affordable. Then I received the Dean's Scholar Scholarship. Without money as a definitive factor, my decision was already made. Virginia Tech was the one school where I truly felt like I would be a person, not just another number.

I spent my first year in general engineering, taking classes that form the foundation of engineering: chemistry, calculus, and physics. As part of the introduction to engineering class, I was exposed to engineering design for the first time. During my first semester, my team designed and built a water purifier that used only biomass as a fuel source and actually worked! Second semester, we designed a collapsible crutch that could be stored under a desk or chair when not in use. Not only did I learn how to work in a team, how to think creatively, and how to communicate my ideas to non-engineers, I also was exposed to different engineering disciplines. At the end of freshman year, I chose Materials Science and Engineering. Initially, I was drawn to MSE because developments in the field of materials are critical to advances in every other area of technology, ranging from new alternative energy sources to smaller, faster electronics to new medical devices. The

ability to design new devices, new technologies that will change our world, hinges on the capability of the materials that designers have at their disposal. The department's emphasis on hands-on laboratory experiences and close-knit community solidified my decision to pursue a degree in MSE.

One aspect I have appreciated most about my department and the College of Engineering is the commitment to research. During my time here, I spent a semester researching the integration of electronic devices into optical fibers to improve the efficiency of optical fibers for the communications industry and give the fibers the capability to detect chemical and biological agents in the mid-wave IR range. I also devoted a summer to researching the creation of novel zinc oxide nanopatterns using a template-molding approach, which resulted in a publication in the Journal of the American Ceramic Society. I am leading a senior design project researching a cutting-edge process of using 3D printing to create molds that can be used to cast “impossible structures” that cannot be manufactured any other way. These impossible cellular lattice structures are being explored as new, lightweight ballistic vehicle armor materials. Research opportunities like these span all eleven departments. Every department encourages students to be passionate, engage in research they are interested in, and learn beyond the classroom.

Virginia Tech's motto is “Ut Prosim,” which means “That I may serve.” Ut Prosim isn't just some phrase on our crest; Ut Prosim is a way of life. Every April, Hokies come together to serve the surrounding Blacksburg community in a day called “The Big Event.” Also in April, thousands of Hokies pack the Drillfield one Friday night and spend the entire night walking around a makeshift track in the largest collegiate Relay for Life in the entire country. We sell t-shirts, baked goods, and pies in the face; we do Zumba at 3 am; we come together in remembrance for those

we have lost. Hokies do not take service lightly, and it pays off. In the past three years alone, Virginia Tech's students have raised over \$1.7 million in the fight against cancer.

The Hokie commitment to service goes far beyond isolated events like Relay and Big Event. I see Ut Prosim every time I walk across campus – students holding doors open for one another, stopping to pick up a dropped plate or fork in the dining hall, checking to make sure a fallen bicyclist is okay. Even though they may seem trivial, these small acts of service are one part of what makes the campus so welcoming and the Hokie community so strong.

Another thing that bonds us all together is Hokie football. There's nothing quite like game day on campus. Starting in the early morning, people in orange and maroon swarm the campus. I've heard that the stadium shakes so much during “Enter Sandman” that it actually measures on the Richter scale as a small earthquake.

There are over 700 clubs associated with Virginia Tech, ranging in purpose from academic to sports to service to purely social. I've played club Ultimate Frisbee the past three years. As a member of the Women's Club team, I traveled all over the East Coast to play in tournaments against other college teams. I've also been a part of academic clubs such as the Materials Engineering Professional Societies and Tau Beta Pi, the engineering honor society, which allow me to connect with other engineers and reach out into the Blacksburg community to share my love of engineering with elementary, middle, and high school students. I've played intramural sports including soccer, dodgeball, and inertube water polo. I'm also a member of the College of Engineering Dean's Team, a team of students that does all the undergraduate recruiting for the College. Beyond just the few that I've mentioned, there are hundreds of other ways to get involved on campus.

You can get involved in Greek life, or in a campus ministry or religious organization. You can rush one of our service fraternities, join the Quidditch team, or be a part of the Sustainability Food Corps. The options are endless. And the best part is, it's never too late to get involved in something new.

This past fall, I realized that even though I was a senior, Virginia Tech still held as many opportunities for me as it had my freshman year. This year, I joined an organization called Students Helping Honduras. SHH is dedicated to building schools in Honduras so that children can have access to education, opportunities for bettering themselves, and the chance to become the next generation of Honduran leaders. Over winter break, I travelled to Honduras with a group of 37 Hokies to break ground for a school in the rural village of Eben Ezer that will provide 150 children with the opportunity to get an education. Throughout the week, I experienced unimaginable poverty, built relationships with men, women, and children from the village, and poured

my own sweat into the foundation of the school. I played soccer in the fields beside the new school, learned to cook Baleadas in the village, and practiced my very rusty Spanish. It was there, between digging trenches, making rebar, playing with children, and laughing with the villagers, that I truly grasped the meaning of Ut Prosim.

Had it not been for the Dean's Scholar scholarship, I would never have been able to attend Virginia Tech in the first place. I would never have had the chance to jump to Enter Sandman, play Ultimate Frisbee, or travel to Honduras. Because this Scholarship allowed me to go through college without having to worry about finances, I took the time I would have spent working a part time job and dedicated it to my academics. I spent that time learning instead of memorizing, taking hard classes not required for my major just because I was interested in them, and supplementing my classroom learning with research projects. I took that extra time to get involved – in clubs, in service, and in the Hokie community as a whole.

Looking back, I know I made the right decision in coming to Virginia Tech. Over the last four years, I've had the chance to be involved in undergraduate research, service projects, club and intramural sports, mentoring programs, and Hokie football games. That's what Virginia Tech is all about: opportunities. The opportunity to choose any department in the College of Engineering and know that whichever one you choose you will get a world-class education. The opportunity to get involved in whatever clubs or activities suit your interests, be it Quidditch, acapella, improv, or even Par Kor. The opportunity to live out the school's motto of "Ut Prosim" and make a difference in someone's life. The opportunity to lose your voice screaming in Lane Stadium, time and time again. The opportunity to be part of a community that is so much bigger than this campus, that reaches out into every corner of the country and the world. The opportunity to be more than just a college student. The opportunity to be a Hokie. ✨

Student Investigates a Less Invasive Way to Analyze the Brain that may Benefit Future Veterans Research

adapted from an article by Alison Matthieson, VT News

July 15, 2013 – "I want to make prosthetics. That's my end goal. But I figured you can't make a prosthetic for someone if you don't know the person who is going to be using it," Stephanie Wiltman of Sewickley, Pa., a senior double majoring in materials science and engineering in the College of Engineering and psychology in the College of Science, said.

Wiltman's dual background made her a perfect fit for the Sciencering program. A prestigious Howard Hughes Medical Institute Science Education Grant funds the undergraduate research program. Through a combination of course work and research experiences, students are exposed to interdisciplinary work combining science, engineering, and law.

Researchers at Virginia Tech Carilion Research Institute use functional magnetic resonance imaging (fMRI) machines extensively to monitor brain activity in a

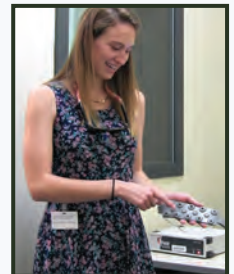
variety of circumstances. This summer, Wiltman is testing how another device, a functional near-infrared spectroscopy, or fNIRS, may be used for some studies instead of, or in addition to, the fMRI.

The limitation of the fNIRS device is that it can only read blood levels a centimeter or two inside the scalp, while the fMRI can look at the entire brain. For certain tasks that are known to activate parts of the brain near the scalp, fNIRS could be a good option for research because it is portable, unlike an fMRI. It also is less invasive for some people who may feel uncomfortable getting in an fMRI.

In particular, the fNIRS could be an option for studies on veterans, especially those with PTSD. "A veteran may say they are fine in closed areas. But once they get in the fMRI and there are all of these booms and bangs from the machine, it can get them worked up. That's what we are trying to avoid."

This summer, Wiltman will not work with veterans specifically, but instead on if the fNIRS accurately collects data about the brain during social learning tasks.

Wiltman hopes her baseline research this summer could open doors to future research with veterans, a special area of interest for her, particularly after an "eye-opening experience" last summer. Through a University Honors' Sophomore Scholarship, Wiltman shadowed at the Naval Medical Center in Portsmouth, Va. Her experiences ranged from scrubbing in for a leg amputation, physical and occupational therapy, and time in the psychiatric wards.



While Wiltman still has two more years to wrap up her double major requirements, she hopes the skills she is gaining now – through undergraduate research, classes, and other experiences – will translate to a career working with veterans in some way. Whether that will be as a prosthetic engineer, working with veterans one-on-one, or for a private firm that makes plastics for prosthetics, she is willing to dive in wherever she can make a difference. ✨

Student News

Dan Drew Awarded National Science Foundation Graduate Research Fellowship



MSE Senior Dan Drew received a National Science Foundation Graduate Research Fellowship. The NSF GRFP "helps ensure the vitality of the human resource base of science and engineering in the United States and reinforces its diversity. The program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master's and doctoral degrees at accredited US institutes."

The three-year fellowship includes tuition and a monthly stipend. Dan plans to use his fellowship at UC Berkeley to pursue a Ph.D. in electrical engineering. ✱

MSE Students Attend Naval Academy Science and Engineering Conference

November 2012 - MSE students Joseph Ullmann and Jennifer DeLong were among five Virginia Tech students nominated and accepted to attend the Fall 2012 Naval Academy Science and Engineering Conference held November 4-6 in Annapolis, Maryland. The U.S. Naval Academy is a leading institution of higher education with a strong emphasis on science, technology, engineering, and mathematics (STEM). Joseph's group of about ten students chose to study graphene, which fit into the renewable energy and alternative fuels category.

This annual conference brings policy makers and science advisors together with university faculty and students. The student-run conference offers a forum in which student participants can engage in discussions and research focused on key scientific and technical challenges. ✱

MSE Student Receives Metallurgy and Metal Casting Scholarships



July 2013 - MSE junior, Sara Fleetwood, has been awarded two scholarships. Most recently, she received a \$2,000 scholarship from H.H. Harris, awarded to students pursuing degrees in metallurgy and metal casting. She also received a \$2,000 scholarship from the Foundry Educational Foundation (FEF), which included an internship. This summer, Sara interned at Bradken in Atchison, Kansas. "My overall goal throughout this internship has been to learn as much as I can and get an idea as to whether this is the type of work I would be interested in doing after college. I've been learning a little bit about everything that goes on at the foundry." In the process manufacturing department, Dan showed her MAGMA software, a mold pouring simulator, and Ron taught her how to weld and arc air. "Most of my time was spent in the metallurgy department learning about different types of testing that can be done on a part to ensure that it meets both the company and customer standards. ✱

Myrissa Maxfield Awarded \$10,000 AIST Foundation Premier Scholarship

July 2013 - MSE junior, Myrissa Maxfield, has been awarded the Premier AIST scholarship of \$10,000 for the 2013-2014 school year. The scholarship includes a paid summer internship at a steel producing facility in North America.



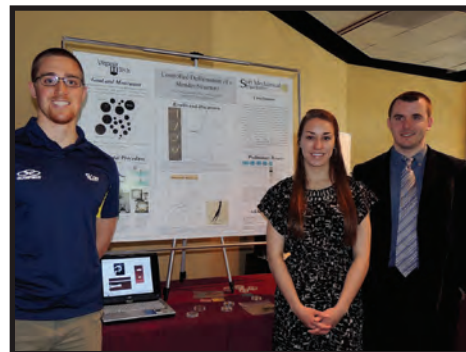
This is the second scholarship Myrissa has received, both awarded within a week. She also received a \$4,000 scholarship from H.H. Harris. In the photo above, Myrissa is interning during summer 2013 at RTI-Martinsville in Martinsville, Virginia. ✱

Seniors Present their Senior Design Year-End Poster Session

by Diane Folz

Thirteen senior design teams from the Department of Materials Science and Engineering presented their final capstone projects in an open-forum poster show on May 10, 2013, in the Torgersen Museum on the Virginia Tech campus. The students interacted with faculty, guests, students (graduate and undergraduate) and staff who viewed the culmination of their year-long projects.

The event played for a full house the entire four-hour session and included an MSE Outstanding Senior Project Winner, "Controlled Deformation of a Slender Structure," by Daniel Flag, Brendan Ondra, and Michelle Leslie. Their work was performed under the direct technical supervision of Dr. Douglas Holmes, an MSE Affiliated Faculty from the Department of Engineering Science and Mechanics. ✱



MSE Graduate Student Awarded NIST Fellowship

Michelle Gervasio, has been awarded a fellowship through the National Physical Science Consortium, which is a partnership between government agencies and laboratories, industry, and higher education. Each fellow is sponsored by a member organization for three years. Michelle's sponsor is NIST, and the support includes tuition, a stipend, and summer internships at the NIST laboratories in Gaithersburg, Maryland. Michelle is advised by MSE Associate Professor Kathy Lu. ✱



Internationalism: Student Perspectives

MSE Junior, Katie Tontodonato goes to Germany

Last summer, I participated in a month-long technical and cultural experience through the Introduction to German Engineering course at Technische Universität Darmstadt (TU-D). The course offered a unique opportunity to experience both life as a German engineering student and as a German engineer working in industry.

The course began with a week-long design project at TU-Darmstadt, which took place Monday through Friday from 8 AM to 5 PM each day. We were placed into four teams of ten students, each with one to two Americans. Our team's task was to design a portable, energetically autonomous process that converts forest residue into a useful product at the site of the wood harvesting. After the project course at TU-Darmstadt, we spent two days visitingACHEMA, the world's largest exposition of instrumentation for the chemical in-

dustry. In Munich, we visited the BMW Group Research and Innovation Center (the FIZ) and toured the BMW factory. A mechanical engineer accompanied us to lunch in the cafeteria and took us on a tour of the FIZ, which houses over 7,000 scientists, engineers, and computer experts. Also in Munich, we visited the Deutsches Museum, which presents natural science and technical collections. The museum is so large that it would take days to fully explore its exhibits. In Ingolstadt, we visited Audi's headquarters and production site.



In addition to an exploration of German engineering, the course also provided a rich cultural experience. Some of our activities included public viewings of European Championship soccer games, touring the Burg Eltz, visiting ruins of Roman baths, visiting the Dachau concentration camp, walking in the English Garden in Munich, and trying local cuisine.

This trip left me with the impression that engineering has become extremely globalized and that Americans are at a great advantage because English is used so extensively worldwide. It reinforced the importance of learning about other cultures and being prepared for international collaboration. I learned much about effective communication and team work with international players as well as what my career could be like in the future. I hope to return to Germany if possible during the course of my engineering studies. *

Tianjin University Senior, Zhijie Ma goes to MSE at VirginiaTech

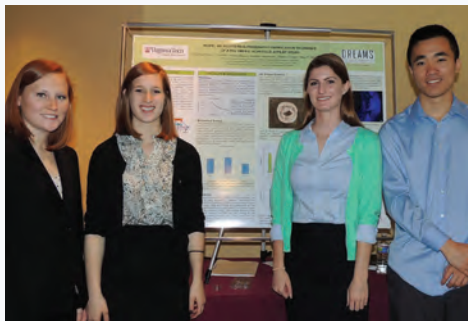
Hi, I am Zhijie Ma, a senior-year exchange student from Tianjin University, the sister university of Virginia Tech MSE in Tianjin City, China. It is hard to believe this awesome year is going to an end. I have always been grateful for being chosen for this exchanging program, to my home university and VT as well.

This year is an unforgettable memory of life. I have to admit that it was hard in the first few days when I realized that the English I have learned is far from enough for a fluent communication. However, I have never felt bad about myself and avoid communicating with others, because I know that is a part of the reasons of why I am here. Besides, all the students and faculty were so warm and I could feel that special care and patience have been given to me. So I went through the transition period very smoothly. And now, I can feel that my English has great-

ly improved and lots of fun comes with it. For me, cultural difference is never a shock but is something exciting to see.

Senior Design with my group members was also a valuable experience for me. I learned how to work effectively in a group and the process of doing research which can be frustrating sometimes. And through classes and many activities, I saw the sense of duty of future American engineers.

This year is not simply just for studying and doing research, it is also a rich experience full of fun and growth.



Blacksburg is the best kind of place I ever want to spend my college year at, though the weather may be unpredictable sometimes. It is a peaceful place where you can focus on your studies and it is a good place to have fun, and at the same time.

Outside campus, I went to D.C, New York, the west coast and Florida to explore America by myself. These travels gave me a comprehensive view about the culture and society of United States. The U.S. is a great country. The diversity and acceptance of different people are what impressed me the most. I would definitely come back for graduate school to further my study. There have been good times and tough times, but never bad time.

I want to thank Dr. Whittington and Dr. Asryan especially for being so nice and patient for me. *

MEPS 2012-2013 HIGHLIGHTS

by Stephanie Sparks

The Material Advantage Student Chapter at Virginia Tech is organized under an umbrella organization known as the Materials Engineering Professional Society (MEPS). The goal of this chapter is to promote the development of students in Materials Science and Engineering. This goal is achieved by organizing academic, professional, outreach, and social activities.

For 2012-2013, MEPS students participated in a symposium created by one of the officers, invited industry speakers to speak at chapter meetings, went on facility tours, and attended and participated in professional conferences to develop academic and professional skills. Also, an industry connection initiative was created to connect students working at the campus foundry (VT-FIRE) with the metal casting industry. Social activities including a banquet and a pig roast were added to traditional activities like fall tail-

gates to promote department fellowship.

In April, five materials science and engineering students from Virginia Tech travelled to Washington, D.C., to discuss with politicians the importance of continued research funding. The trip included briefings at the Top of the Hill Banquet Hall and visiting representative offices such as Representatives Bob Goodlatte and Morgan Griffith. Representative Griffith gave us a great reception and reassured us that he had our best interests in mind. Overall, attending Congressional Visits Day was a worthwhile experience from which we all gained much.

Lastly, one of the greatest achievements of this year's chapter was the expansion of our outreach program. This achievement can be attributed to the creation of a Student Ambassadors program led by one of the MEPS officers.

It is believed that efforts taken this year to promote positive development within the Materials Science and Engineering department at Virginia Tech were successful in fulfilling the purpose of Material Advantage and the associated professional societies. This type of development has provided opportunities for the students at Virginia Tech to advance their own lives as well as the field of Materials Science and Engineering. *



Students meet with Representative Morgan Griffith during Congressional Visits Day



MEPS students who attended a launch viewing with NASA engineers



A high school junior pours metal into a mold during the PCI event.



Students enjoy lunch hosted by George Wicks, former president of ACerS Board of Directors

2013-14 MEPS Elected Officers

President
Anthony Schiavo

Vice President
Katie Tontodonato

Treasurer
Dan Diner

Secretary
Joe Rittenhouse

Outreach Coordinator
David Lichtman

SEC chair
Kirby Boone

Webmaster
Cameron Reynolds

TMS
Anthony Schiavo

AIST
David Lichtman

MRS
Katie Tontodonato

Acers/PSCA
Kirby Boone

AFS
Chris Nellis

Spring 2013 Materials Science and Engineering Bachelor of Science Degrees

<i>Margaret E. Anderson</i>	<i>Daniel H. Flagg</i>	<i>Samara M. Levine</i>	<i>James A. Stratton</i>
<i>Heather E. Blount</i>	<i>Charles A. Forman</i>	<i>Shawn R. McKinney</i>	<i>Arielle P. Strong</i>
<i>Morgan L. Brown</i>	<i>Colin C. Glesner</i>	<i>Kelly C. Ramsburg</i>	<i>Shuo Tang</i>
<i>Justin A. Carnile</i>	<i>Timothy M. Horne</i>	<i>Joshua D. Rice</i>	<i>Joseph D. Ullmann</i>
<i>Sunny Chang</i>	<i>Kelly M. Hotchkiss</i>	<i>William C. Rowland</i>	<i>Katelyn M. Waldeisen</i>
<i>Haley D. Cherniuk</i>	<i>Vincent D. Iozzo</i>	<i>Justin J. Ryan</i>	<i>Patrick C. Walsh</i>
<i>Cameron H. Curtis</i>	<i>Ruth A. Kay</i>	<i>Mary E. Seals</i>	<i>Andrew R. Wentzel</i>
<i>Tyler G. Dietrick</i>	<i>Lyndsay M. Kibler</i>	<i>Patrick D. Sinko</i>	<i>Derrick J. Zimmer</i>
<i>Daniel S. Drew</i>	<i>Joshua J.W. Larrick</i>	<i>Stephanie A. Sparks</i>	<i>Thomas J. Zimmerman</i>
<i>Alexandra M. Egert</i>	<i>Michelle T. Leslie</i>	<i>Patrick J. Stockhausen</i>	

2013 Undergraduate Awards and Scholarships

<p>Michael Stuback Memorial Scholarship <i>Peter Barbieri</i> <i>Sean Conden</i> <i>Kathryn Hoyme</i></p>	<p>Ronald S. Gordon Scholarship <i>Peter Barbieri</i> <i>Nizar Zahed</i></p>	<p>H.H. Harris Scholarship <i>Myrissa Maxfield</i> <i>Sara Fleetwood</i></p>
<p>Charles P. Blankenship Scholarship <i>Peter Barbieri</i> <i>Ben Conlon</i> <i>Sarah Desilva</i> <i>Samuel Edwards</i> <i>Chris Nellis</i></p>	<p>Gary S. Clevinger Memorial <i>Michelle Gervasio</i> <i>Michael Kidd</i></p>	<p>Foundry Educational Foundation Scholarship <i>Sara Fleetwood</i> <i>Ruth Kay</i> <i>Patrick Stockhausen</i> <i>Patrick Walsh</i></p>
<p>Thomas G. Stroyan Memorial Scholarship <i>Kathryn Hoyme</i> <i>Matthew McGuire</i> <i>Whi Su Shim</i></p>	<p>Alfred E. Knobler <i>Farhan Hasan</i> <i>Carli Kitto</i> <i>Allison Popernack</i> <i>Joe Rittenhouse</i> <i>Sarah Whipkey</i></p>	<p>AIST Foundation Premier Scholarship <i>Myrissa Maxfield</i></p>
<p>John H. Kroehling <i>Devon Baker</i> <i>Rafael Gil-Figueroa</i> <i>Samir Javid</i> <i>Myrissa Maxfield</i></p>	<p>Precision Castparts Corporation Scholarship <i>Haley Cherniuk</i> <i>Myrissa Maxfield</i> <i>Mary Seals</i></p>	<p>AIST Southeast Member Chapter Scholarship <i>Devon Baker</i></p>
		<p>AFS Piedmont Chapter Scholarship <i>Devon Baker</i> <i>Shawn McKinney</i> <i>Drew Snelling</i></p>

2012-2013 Materials Science and Engineering Graduate Degrees

Doctor of Philosophy

Name	Dissertation Title	Advisor
Wenle Li	Study of Freeze-Cast Porous Silica Nanoparticle-based Composites	K. Lu
Bo Chen	Growth of Anodic Alumina Nanopores and Titania Nanotubes and their Applications	K. Lu
Deepam Maurya	Synthesis-Structure-Property Relationships in Lead-Free Piezoelectric Materials	S. Priya
Neal Pfeifferberger	Single Crystal Sapphire Photonic Crystal Fibers	G. Pickrell
Su Chul Yang	Lead - Free Piezoelectric Based Magnetolectric Composites	S. Priya
Chun-Hsien Wu	Microstructure of Flash Processed Steel Characterized by Electron Backscatter Diffraction	M. Murayama/ W. Reynolds
Junqi Gao	Magnetolectric (ME) Composites and Functional Devices Based on ME Effect	D. Viehland
Yu Chang Wu	Theory of Modulation Response of Semiconductor Quantum Dot Lasers	L. Asryan
Shashaank Gupta	High Performance Lead-free Piezoelectric Materials	S. Priya

Master of Science/Master in Engineering

Name	Thesis Title	Advisor
Amanda Krause	Characterization Study of Plasma Spray Attachment of Intrinsic Fabry-Perot Interferometric Sensors in Power Generation Applications	G. Pickrell
Andrew Kulp	Analysis of Strength Variation in Glass Due to Ion Exchange	D. Clark
Marianne Lindsay	Development of Lithium Disilicate Microstructure Graded Glass Ceramic	D. Clark
Sayanti Banerjee	Effect of Chemistry on the Transformation of Austenite to Martensite for Intercritically Austempered Ductile Iron	A. Druschitz
Hesham Elmkharram	Mechanically Processed Alumina Reinforced Ultra-High Molecular Weight Polyethylene (UHMWPE) Matrix Composites	A. Aning
Jonathan Hoang	Origin of the Time-Dependent Melting of Semicrystalline Polymers	H. Marand
Nana Kwame Yamoah	Microstructure Characterization of SUS444 Ferritic Stainless Steel	M. Murayama
Denisse Aranda	N/A	M. Kelley
Atieh Haghdoost	N/A	S. Corcoran
Christopher Devreugd	N/A	W. Reynolds
Daniel Frydryk	N/A	S. Corcoran

MSE Alumna Julie Martin Receives Prestigious AAA Award

*Reprinted from Clemson
University Website*



Clemson University researcher Julie P. Martin has been awarded a science and technology policy fellowship by the American Association for the Advancement of Science.

Martin will be positioned at the National Science Foundation (NSF) in the Washington, D.C., area beginning Sept. 1 helping manage the agency's role as a policy leader in science, technology, engineering and mathematics (STEM) education and STEM workforce development. She will work on initiatives ranging from pre-kindergarten through graduate school education and increasing diversity in the STEM workforce to closing skill gaps in critical STEM occupations in the federal government.

"The AAAS Science and Technology Policy Fellowship is an honor for Dr. Martin and Clemson University," said Larry Dooley, interim dean of Clemson's College of Engineering and Science. "Martin's contributions to the success of STEM education and women in engineering is valued by Clemson and serves as another testament to the university's role as a leading research institution."

Martin is an assistant professor in the College of Engineering and Science, where her research focuses on increasing the participation of women, minorities and first-generation college students in undergraduate engineering programs. In 2009, Martin was awarded the National Science Foundation's Early Faculty Career (CAREER) Award for her research examining social capital and under-represented engineering students' academic and career decisions.

Martin received the 2012 Distinguished Service Award from Women in Engineering ProActive Network (WEPAN), the nation's leading organization and catalyst for transforming culture in engineering education to promote the success of all women.

continued on page 15

MSE Alum Success story: Internship Becomes Dream Job for Young Engineer

*by Carden Hedeit,
MSSC Corp. Communications
Reprinted with Permission from the
U.S. Marine Corps website, April 30, 2013*



At the age of 24, Marine Corps Systems Command engineering intern Dennis Hollich has already traveled far and wide for his job, doing things other engineers his age would only dream of doing.

He spent a few months in Panama City, Fl. He visited Hawaii, Thailand and The Philippines on one rotation, and Yuma, Ariz., on another.

He has had these opportunities through the Navy internship program, now the Recent Graduates Program, at MCSC. Candidates spend two to two and a half years as paid interns and, upon meeting certain requirements, enter the workforce.

The aim of the program is to bring on the best and brightest young technical minds straight out of college and set them on the path to be the experienced engineers the Marine Corps needs in the future. So far, Hollich has proved to be that kind of mind.

On his travels, far and near, he has had the chance to do things like get behind the wheel of a Mine Resistant Ambush Protected All-Terrain Vehicle and test flame-resistant clothing with a flame so big and bright it could have damaged his vision without protective glasses.

Hollich first came to MCSC as a summer hire between his sophomore and junior years at Virginia Tech, then again between his junior and senior years. He started his summer hire work with Infantry Combat Equipment, where he said he was thrown right into the fire.

continued on page 15

President Obama Honors Outstanding Early-Career Scientists



MSE Alumnus, Keith Knipling, was among 96 researchers to receive a Presidential Early Career Award for Scientists and Engineers, which is the highest honor bestowed by the U.S. Government on young science and engineering professionals.

Keith completed his B.S. in MSE in 1998 and his master's in MSE in 2002, both at Virginia Tech. He completed a Ph.D. in MSE at Northwestern University in 2006. Keith works at the Naval Research Lab in Washington, D.C., and is one of 16 scientists who received the award for research related to the Department of Defense. ✱

MSE Graduate Alumnus Wins 2nd Place in Poster Competition

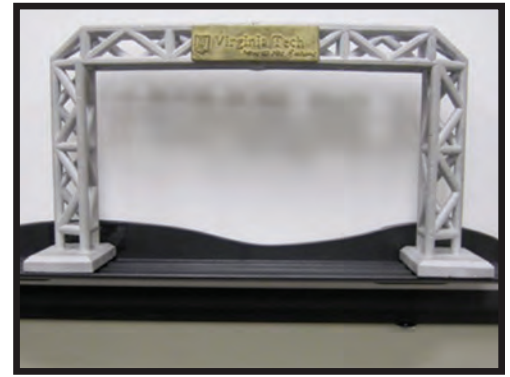
Raghunath Thridandapani completed his Ph.D. in MSE in 2011. In July 2012, he attended the 2nd Global Congress on Microwave Energy Applications held in Long Beach, Calif. He won second place in the Graduate Poster Competition for "Development of Microwave Dilatometer for Constructing Master Sintering Curves," R. Thridandapani, D. Folz, D. Clark. Raghu is working as a Process Engineer for D1D Implant in Oregon. ✱



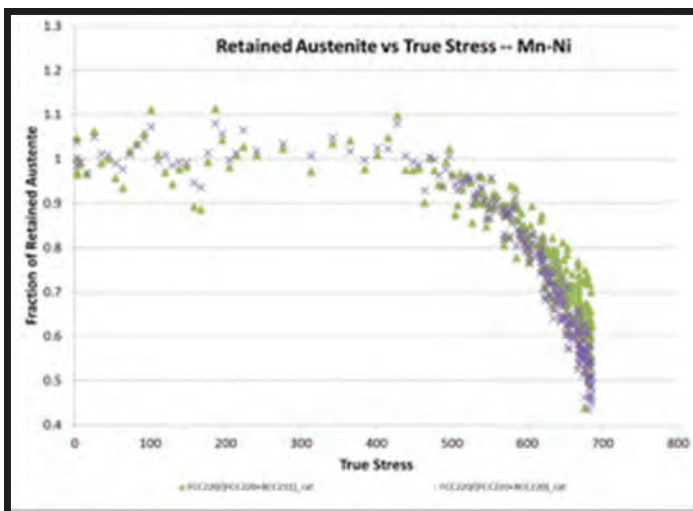
Metal casting...continued from page 1

that have outstanding mechanical properties and low areal density, melting and casting of high purity aluminum alloys alloyed with trace amounts of specific elements to produce low voltage, sacrificial anodes for marine applications, melting and casting of high purity iron alloys for intercritically austempered ductile iron, chemistry and heat treatment optimization for austempered cast steel alloys for automotive applications, chemistry and heat treatment optimization for high strength/high toughness cast aluminum alloys for automotive and military applications, melting and molten metal treatment practices for copper based alloys, chemistry and heat treatment optimization for cast nickel based superalloys, and the optimization of printed polymers for expendable patterns for investment casting.

The use of 3D printing (additive manufacturing) in the foundry is a “disruptive” casting technology since it allows the production of previously impossible to cast structures, eliminates many of the constraints of the current sand molding processes, and eliminates the need for costly patterns, which reduces lead time and cost. Math based engineering and design are being coupled with two math based molding processes: sand molding and expendable patterns. The ability to “print” a sand mold or an expendable pattern equates to faster-to-market, lower cost, and greater flexibility in design since the need for pattern tooling is eliminated. By eliminating the pattern tooling, used to form the desired casting shape, future castings will not require draft and features such as undercuts will be possible. The castings of tomorrow will be very different as these processes become fully developed. Virginia Tech metal casting students may well lead the way to a new foundry industry.



Cast truss structure produced using a 3D printed ABS plastic expendable pattern.



Graph showing the transformation of austenite to martensite as a function of applied stress for a Mn-Ni intercritically austempered ductile iron.

The ability to control the chemistry of a casting is not only important, it is critical to research. At VT-FIRE, we are melting and casting high purity ferrous and non-ferrous alloys for research into sacrificial anodes, intercritically austempered ductile iron, advanced high strength steels, and nickel based superalloys. Low voltage, aluminum, sacrificial anodes are of interest to the Navy since maintenance to combat corrosion costs about \$3 billion per year. Low voltage, aluminum, sacrificial anodes can help prevent corrosion plus reduce the likelihood of hydrogen embrittlement of the ship's steel structure. Dr. Druschitz has three patents on intercritically austempered ductile iron and has been working on understanding the individual effects of the required alloying elements. Recent research demonstrated that nickel is very effective but expensive and manganese produces the correct microstructure and is inexpensive, but the end product is significantly less ductile compared to those produced using nickel. However, the combination of nickel and manganese can produce a good material at significantly lower cost. Ongoing research is aimed at producing higher purity alloys to more clearly determine the effects of these alloying elements.

A new thrust is to provide students with a greater understanding of steel, one of the most widely used engineering materials known to man. The steel industry has undergone a renaissance and the need for highly trained engineers who understand modern steel making is critical. VT-FIRE's melting and casting capabilities provide a unique resource for achieving this goal. Education and research are being combined in the areas of steel melting, casting, and heat treating. *



Tapping a heat of steel at VT-FIRE.

Julie Martin...continued from page 13

The Distinguished Service Award recognizes WEPAN members whose individual service has made a significant impact for the organization. Martin, who served four years on the WEPAN board of directors, including positions as director of communications, national president-elect, president and past president, was honored June 25 at the WEPAN National Conference in Columbus, Ohio.

Martin joined the Clemson faculty in 2008 after serving as the director of undergraduate engineering student recruitment and retention at the University of Houston. Martin holds degrees in materials science and engineering from North Carolina State University and Virginia Polytechnic Institute and State University. *

MSE Success Story...continued from page 13

Hollich decided to continue on as an intern after graduating from Virginia Tech in the summer of 2010 because he was already familiar with his place of work, he said. He knew the battle rhythm at MCSC and which questions to ask, and he had some idea what to expect in his new job.

Hollich came to Program Manager Ground Transportation Engineering Systems where he said he never turned down an opportunity to learn something or try

something different.

He remembers a trip to Norfolk, Virginia, where he got to look aboard ships to see the difference a few inches would make. The smallest fraction of an inch over the specification could mean the difference between getting more gear on a ship and even getting certain gear on board at all.

Now Hollich works in Marine Air-Ground Task Force Command, Control and Communications—MC3 for short—where he serves as lead engineer for three systems, including Marine Corps Civil Information Management System, or MARCIMS.

His supervisor, Basil Moncrief, said having a 24-year-old lead engineer isn't typical, but his trust in Hollich is firmly founded.

"I couldn't live without him," said Moncrief, technology transition office lead in MC3. "He's very smart, very aggressive and he's a self starter."

Moncrief also said that Hollich conceptualized the approach the MARCIMS team used for information assurance, data storage and retrieval. The MARCIMS program creates databases of shared information and gives Marines readily available access to information gathered by other users during civil operations.

Moncrief said Hollich displayed the traits of a more seasoned engineer in his work

on MARCIMS.

"It's remarkable to me how he has jumped in and started functioning like a very experienced engineer," Moncrief said. "He looks around corners—he tries to figure out future problems and checks out other projects to see if he can borrow from them." *

Heads Up...continued from page 16

MSE received a \$40,000 pledge from the AFS-Piedmont Chapter to support VT-FIRE.

- Myrissa Maxfield, an MSE junior, received a \$10,000 AIST Foundation Premium Scholarship for 2013-14.
- The AFS Piedmont Chapter awarded \$10,500 in scholarships to 10 students.
- Virginia Tech (MSE) is one of 19 universities worldwide to be certified by the Foundry Education Foundation (FEF).
- Through the efforts of Professor Bob Hendricks, MSE prepared a space proposal to the College of Engineering. The proposal received an excellent review in the highly competitive process and MSE received about 10,000 ft² of space. We expect to occupy the new space in fall 2014.

As always we thank our alumni for their continued support and loyalty. Please e-mail us, stop by the department, or join us during one of our pre-game tailgates. Just stay in touch! *

Exploring Materials at Virginia Tech

Department of Materials Science and Engineering
213 Holden Hall (0237)
445 Old Turner Street
Virginia Tech
Blacksburg, Virginia 24061

We always enjoy hearing from alumni and friends.
Send us a note or send an email.
email: mse@vt.edu
website: www.mse.vt.edu

Editor

LeeAnn Ellis
Layout
Christine Burgoyne

Contributing Writers

Christine Burgoyne
David Clark
Alan Druschitz
LeeAnn Ellis
Carden Hedeit
Diane Folz
Zhije Ma
Allison Matthieson
Kelly Ramsburg
Katie Tontodonato
Stephanie Sparks
Abby Whittington

Original Cover Background

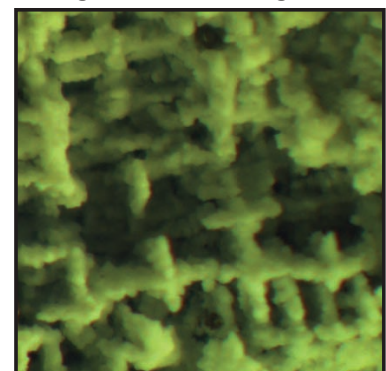


Image courtesy of Professor Alan Druschitz. SEM photomicrograph of corrosion surface of an Al-5.3 wt% Zn-0.011 wt% in sacrificial anode showing preferential corrosion of the zinc rich interdendritic regions.



Heads Up!

David Clark

MSE Department Head

The department continues to grow and prosper. This past spring we graduated the largest undergraduate class ever. Thirty-nine students received their Bachelor of Science degrees. About 25% of these students will attend graduate school either at Virginia Tech or other highly ranked universities. Others will work in industries ranging from metal casting to forensic science. Nine students also received the Doctor of Philosophy degree, eleven received the Master of Science, and four received the Master of Engineering.

The MEPS student organization had a productive year including attending professional society meetings, arranging industry tours, and expanding its outreach program through the creation of an ambassadors program. Five students attended Congressional Visits Day and met with Representatives Bob Goodlatte and Morgan Griffith. They also received a good overview about how research funding works. Several of our students received prestigious fellowships and scholarships from organizations such as

NSF, NIST, and AIST, and several others took advantage of our summer programs in Germany and China.

Our faculty continue to do well and provide exciting opportunities to our students. Professors Abby Whittington and Alex Aning led a group of five undergraduate students on a three-week cultural exchange program to Tianjin University in China last summer. They also presented short courses in metallurgy and biomaterials during the program. In February of this year, our faculty hosted 20 students and 2 faculty from Tianjin University as part of the cultural exchange program. Professor Alan Druschitz participated in several student outreach programs using VT-FIRE as a tool to encourage pre-college as well as freshmen to consider metallurgy as a career.

In January 2013, MSE's graduate program was evaluated by an external team. It is a university/college requirement that all graduate programs be evaluated every five years. The evaluation team did a thorough review and made a number of recommendations that we expect to implement this year. At the same time, we have been preparing for an ABET review this fall. Professor Sean Corcoran, with the assistance of his ABET Committee and academic program office, submitted the self-assessment document in June. I

would like to thank the faculty and our MSE Advisory Board for their significant contributions to both the graduate program review and ABET preparations.

In closing, I would like to mention a few additional highlights.

- In 2012/13, we published 114 papers in refereed journals and conference proceedings and received over \$3.3 million in new research funding.
- Professor Mitsuhiro Murayama received a 3M Nontenured Faculty award for his work in three-dimensional transmission electron microscopy.
- Professor Kathy Lu received the Friedrich Wilhelm Bessel Research Award from the Alexander von Humboldt Foundation in Germany and spent a two-semester sabbatical at the Technical University of Darmstadt.
- Professor Diana Farkas has been named the NSF Program Director for the MPS/DMR Metals and Metallic Nanostructures Program
- Through the efforts of Paul Huffman (alumnus and MSE Board member), Professor Alan Druschitz, and others,

continued on page 15