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Dear Alumni and Friends:

I just blew the dust off my keyboard to write you this note.

Dust from the “old ME” renovation that is! The most ambitious building renovation in the history of the ME department (which goes back to 1889) is now in full swing! At this moment, the department has vacated almost every room in the 1948 “North Wing” of the ME building. Believe me, there is no lack of action: holes get cut into concrete ceilings to accommodate new air handling shafts to make the building breathe, every pipe is being ripped out and replaced to make the water flow, and every single wire is being pulled to make room for new arteries of electrical power. A new penthouse now crowns the building and will soon hold the new air-handling equipment. Finally, our old single pane windows, the latest in technology in the 1940s, are being exchanged for energy saving double pane windows.

This project is certainly painful in the short term: about half of our research space and most of our teaching labs have been moved into temporary housing. Many students and faculty will have to move twice before they can return to their renovated spaces. But the long term gain is worth the short term pain. Once all is said and done, the ME department will own some of the most up-to-date and modern teaching and research space in the nation!

All this commotion did not escape the attention of our external review committee. The University asked a committee of five department heads and faculty administrators from our peer institutions to take a critical look at all programs in the ME department. Reviewers came from the University of California-Berkeley, the University of Illinois-Urbana Champaign, Penn State, Ohio State, and the University of Texas-Austin. After reading our approximately 300-page self study report, for nearly two days the committee interacted with our faculty, students, staff, alumni, and ME’s industrial advisory board. Following these two days, the committee reported to the Provost and Deans what we had known all along: that the ME Department at the University of Minnesota is a great department!

While the committee departed well impressed, they also left us with good recommendations from an outsider’s perspective on how to further improve our programs. This advice is well appreciated.

If you are reading this, you probably think that things for ME are going well and there is nothing to worry about. Well, that is correct—for the most part! While new pipes, wires, and windows will make the old ME building code compliant and safe, they will not make it pretty. This is why we decided that now is the time to not only repair and update the infrastructure, but also to renovate and upgrade our research labs and seven undergraduate teaching labs. While the infrastructure upgrade—pipes, wires, windows—is funded by the State at a cost of $44M, improving our laboratory layouts and renovating all of our teaching labs is estimated to cost $5M. Once raised, these remaining funds will let us complete the renovation. We will then be able to provide our undergraduate students with a state-of-the-art learning experience and our faculty and graduate students with the most modern research labs in spaces that reflect the quality of our work. If you feel that this is important and would like to learn more, please feel free to contact me. There are naming opportunities available with all of the lab spaces.

Sincerely,

Uwe Kortshagen
Distinguished McKnight University Professor and Head of Mechanical Engineering
E-mail: Kortshagen@umn.edu

A LETTER FROM THE...

DEPARTMENT HEAD

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E-mail: Kortshagen@umn.edu
In 1958, the Department of Mechanical Engineering started the Engineering Co-op Program. Today over 30% of ME students in the last two years of their academic career receive work experience in the fields of Mechanical, Industrial, or Electrical & Computer Engineering, with some going on to have long-term careers with these same companies. Our ME Department Head, Professor Uwe Kortshagen, along with Professor Frank Kelso, Director of the Co-op Program, are determined to reach 50% participation.

Students complete either two or three full-time work periods alternating with semesters of full-time academic coursework. Thus, students typically work one fall semester, one spring semester, and one summer semester. Although it is recommended to have alternating semesters, it is not unusual to have two work semesters back to back.

Many students graduate with a degree from the College of Science and Engineering (CSE) each year, but Co-op students graduate with a degree that is more than a degree. They have eight months to one year of practical knowledge and work experience, giving them a significant competitive edge in today’s job market.

**Two Goals of the Co-op Program**

The first goal of the Co-op Program is to provide students with an understanding of an engineer’s role in the technical world. The program gives them an opportunity to apply some of their knowledge of fundamental theory to practical problem solving.

In most cases it helps students select a direction in the broad field of engineering and thus influences their selection of elective courses. The experience motivates students to plan and successfully complete their academic program.

The second and equally important goal is writing development with a broad range of assignments. Technical journal exercises allows for an introduction into this profession of the field, as well as gaining a familiarity with the many published engineering research materials available.

We have numerous success stories from students showcasing their ME Co-op Program experience. The following features are four of those stories.

Jessica continues to be a part of the Honeywell team, holding a full-time position as Project Manager. “I had heard really great things about getting to do bigger projects and be more involved from beginning to end as opposed to a three month internship where you don’t have the time to do that. I was really lucky that I was able to do that at Honeywell and see a couple projects through. It was nice getting credit, while also learning about engineering processes where I had no previous experience.”

Jessica credits her five years of involvement with the Science and Engineering Student Board, (where she held the position of President during her last year), for allowing her an internal link between College of Science and Engineering faculty, staff and student groups. CSE Ambassadors is a peer mentor program assisted in outreach activities, where students in the CSE community support prospective students. Jessica was also involved with this group as a mentor for three years, assisting with outreach, recruitment and mentorship opportunities for prospective students. “Having someone be there who can mentor you and give them advice” as a mentor is something she wishes she would’ve done as an incoming freshman.

When asked what her favorite thing about the U was, Jessica said the amazing faculty and staff, who are there to promote various opportunities to get involved, whether starting a new group, or joining an established one. Professor and Director of Undergraduate Studies, Tom Chase, stands out in her mind as a person who cared about matching every name to a face, and making sure that the students understood the material that was presented. Professor and Associate Dean for Undergraduate Studies, Paul Styrkowsi, led the study abroad program that Jessica was involved in, as well as being an advisor for the CSE student board. “Professor Styrkowsi not only cares about succeeding in class, but also about succeeding in life.”
Andy McChain graduated May of 2012 with his degree in Mechanical Engineering, but before he graduated, Andy had a goal to enter the Co-op Program and discover what it was like to be a Mechanical Engineer. The fall of his sophomore year, Andy began his journey.

Andy believes the co-op program was the main asset that set him apart from other mechanical engineering graduates. “The co-op program showed employers that I knew what it was like to work as a mechanical engineer.”

Many factors played a key role in Andy’s success, from professors to relevant coursework, all of which he gained valuable knowledge. “Professor Frank Kelso was a great influence on his students,” Andy explained. “He spent so much of his career working in the industry. His background was evident in how much his assignments related to real engineering problems.”

Advanced Mechanism Design was his favorite class, taught by Professor Tom Chase and Professor Art Erdman, respectively, but the Co-op Program was
The National Society of Black Engineers (NSBE) is one of the largest student-governed organizations based in the United States, with more than 30,000 members around the world. NSBE’s mission is “to increase the number of culturally responsible Black engineers who excel academically, succeed professionally and positively impact the community.” In the undergraduate level, NSBE is run through university chapters, offering mentorship, organizing study sessions, and hosting company information sessions to connect talent.

Mohamed Sereme is the current V.P. for the UMN-NSBE chapter. He is a senior studying Mechanical Engineering and has been involved with NSBE since his transfer in 2012, where shortly after he held the Programs Chair board position during the 2013-14 academic year. “Ever since, NSBE has been a family to me, wherein I have created great bonds of friendship.”

As the academic year rounds up, the board is recruiting board position members for the coming year. Board positions are obtained through elections wherein only paid members are allowed to vote. An annual banquet is held to recognize outstanding members, corporate sponsors, and new board members. The newly elected board members are invited to attend a regional leadership conference during the summer to gain knowledge on effectively running a chapter.

Anaheim, California was the host city for the national NSBE convention this year, which showcased 300 companies in attendance for their career fair, workshops, and chapter competitions. NSBE members were able to interact and network with company representatives, with some UMN-NSBE members receiving offers for internships or full-time positions.

### TECHNOLOGY

Blood cells and stem cells, generally obtained through donations, are an important resource for biotechnology, disease treatment, and advancing medical research. After collection, cells are stored for future use by a freezing technique using chemicals to help cells survive the process. When the cells are later prepared for use, the chemicals have to be removed, as they can be harmful to humans.

MesoFlow manufactures a device that prepares biological cells for use in medical procedures like bone marrow transplants and to treat diseases like sickle cell anemia. The company is based on scientific discoveries by the UMN’s Allison Hubel, Ph.D., ME professor with the College of Science & Engineering.

**MesoFlow’s technology improves the process of cleaning cells by lowering the cost of the equipment needed, eliminating the need for a specialist to operate it and increasing the number of usable cells that remain. The technology is also more thorough in removing chemicals from cells, making transplants and transplants safer for the patient.**

Going forward, the technology will allow red blood cells to be stored for a longer period of time, which could solve the two central challenges in blood banks: blood supply shortages for rare blood types and the need to discard more common blood types that reach their expiration. The low cost and disposable nature of the device could also make medical procedures that rely on stored blood or stem cells more widely available to developing countries.

### MILESTONES

- **Before MesoFlow’s official launch,** the technology behind the company was named a 2013 Minnesota Cup finalist in the statewide entrepreneurial competition’s Life Science and Health I.T. division.
- **Cofounders Allison Hubel and Kai Kroll** finished the licensing process for the technology behind MesoFlow and launched the company in May 2014.
- **LifeScience Alley,** a Minnesota-based business association, named MesoFlow to its 2014 New Technology Showcase, which recognizes ground-breaking achievements in health care technology.

“This technology will help us get the most out of our stored blood and stem cells, but it can also make a difference in the places where access to these cells has traditionally been limited. By cutting the cost of cleaning cells and eliminating the need for a highly skilled specialist, we are opening new doors for stored cells to reach places where they are typically unavailable. It’s exciting to anticipate how this technology can provide vital blood transfusions or stem cell transplants to those in developing countries as well as those in combat situations, where the need is great but the supply is short.” —Allison Hubel, MesoFlow founder and CEO

Allison Hubel earned her Ph.D. in mechanical engineering at the Massachusetts Institute of Technology and is currently a professor of mechanical engineering with the University of Minnesota’s College of Science and Engineering. With almost 20 years of experience, Hubel is a recognized global leader and innovator in cell and tissue preservation. She is director of the U’s Biopreservation Core Resource (BioCoR), which advances the science of storing and preserving bioprecipents — living molecules like DNA, cells and tissues — and serves as a national resource for hospitals, companies and academic institutions. Hubel also serves as deputy editor for the scholarly publication Bio-preservation and Bio-banking.

MesoFlow was launched May 2014, located in Minneapolis, MN. www.mesoflow.com

This feature courtesy of INQUIRY, a publication of the U’s Office of the Vice President for Research, and can be found online at http://umn.edu/minnesota/
2014-2015 Scholarship Recipients

Andres Campos Alvarado, S’16 - Swanson, and Surly Scholarships
Brant Axt, S’15 - Kuehn, and Surly Scholarships
Matt Baldwin, F’15 - Warren Ibele, and
Henry Morgan Nelson & Elveda Jackson Nelson Scholarships
Mary Benbenek, S’15 - Boeing, and Wilson Scholarships
Dylan Benoit, S’16 - Hans Nyman, and A. F. Johnson Scholarships
Zoe Bohnen, S’16 - Roger & Mary Haxby, and Walter & Margaret Pierce Scholarships
Rachael Brandt, S’16 - Barbara & Robin Schaller, and ME Scholarships
Noah Blankenship, S’16 - Peter Freund Scholarship
Michael Donahue, S’17 - Russell R. Erickson, and A. F. Johnson Scholarships
Dallas Erdahl, S’15 - A. F. Johnson, and Vieth Scholarships
Kyle Engen, S’15 - ASMRAE Scholarship
Jacob Fenske, S’15 - Walter & Margaret Pierce Scholarship
Adam Fiegen, S’15 - Michael Conny, and ME Scholarships
Katie Hauwiller, S’16 - Barbara & Robin Schaller, and Walter & Margaret Pierce Scholarships
Roxana Karami, S’16 - Virgil Marple, and Walter & Margaret Pierce
Adam Litke, S’15 - Boeing, and A. F. Johnson Scholarships
Benjamin Latimer, F’15 - Katsuhiko Ogata, and Horton Scholarships
Taylor Lund, S’15 - John G. & Joyce M. Wilson Scholarship
Spencer Neitz, S’16 - Jim Ramsey, and
ME Scholarships
Mitchell Page, S’17 - Boeing, and ME Scholarships
Courtney Rau, S’16 - Alvin Flynn, and A. F. Johnson Scholarships
Rachel Troutman, S’16 - Barbara & Robin Schaller, and Henry Morgan Nelson & Elveda Jackson Nelson Scholarships
Eric Villadsen, S’16 - A. F. Johnson, and Walter & Margaret Pierce Scholarships

Fall 2014 Mechanical Engineering Graduates

2014 Senior Design Show

Visit and like our ME Facebook page to view more photos! www.facebook.com/umn.me
The 14th Annual Design of Medical Devices Conference was held at the Commons Hotel April 13–16, 2015.

Highlights from this year’s conference included transmitting two interactive Structural Heart Clinical Live Cases from the CardioVascular Center Frankfurt (CVC Frankfurt), Germany/St. Josef’s Hospital Wiesbaden, Germany. The clinical cases featured an Aortic Heart Valve Disease and a Mitral Heart Valve Disease.

Notable presentations were given by:

- Susan Alpert, SFA Consulting LLC
- Jia-Jin Jason Chen, Distinguished Professor, Department of Biomedical Engineering, National Cheng Kung University
- William Cohn, Texas Heart Institute/Baylor College of Medicine
- Yue Dong, Research Scientist, Anesthesia Clinical Research, Assistant Professor of Medicine, Mayo Clinic College of Medicine
- Christal Sheppard, Director, Detroit Satellite Office, United States Patent and Trademark Office
- John Rogers, University of Illinois Urbana-Champaign
- Ron Leonhardt, Vice President, Global HR, EHS and Corporate Communications, Smiths Medical
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- Tan Sze Wee, Deputy Executive Director, Biomedical Research Council, Programme Director, Healthcare & Lifestyle Programme, Agency for Science, Technology and Research (A*STAR)

Susan Alpert, SFA Consulting LLC, was awarded the 2015 DMD Conference Award.

The conference had another successful year with attendance reaching over 1,200 and raised $150,000 from 42 sponsors. The money raised will support medical devices education at the University of Minnesota, the University of Minnesota Medical Devices Center and the Design of Medical Devices Conference expenses.

For more information, visit: www.dmd.umn.edu

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Juliana Abel joined the Department of Mechanical Engineering in December 2014 as a Benjamin Mayhugh Assistant Professor. Her research is focused on the model-based design of smart material materials and structures, with an emphasis on geometric and textile-based architectures for the creation of novel actuators, sensors, and energy harvesters.

Abel grew up in Canton, Ohio, as the oldest of four siblings. During her childhood, she didn’t know any engineers (her mom is a nurse, and her dad is a carpenter). However, Abel’s family occasionally took road trips to visit her grandfather in Cocoa Beach, Florida, where they visited NASA Kennedy Space Center and saw several space shuttle launches. “My interest in spaceflight sparked my desire to become an engineer, which led to my pursuit of a mechanical engineering degree at the University of Cincinnati.”

The breadth provided by a mechanical engineering degree would provide a foundation to study a diverse range of applications including aircraft, spacecraft, biomedical devices, civil structures, and consumer products. Abel chose Cincinnati because of the co-op program, which was mandatory for all engineering students. “I was excited about the co-op program because I realized it would give me opportunities early in my education to work in the field, to determine if engineering was a good fit.”

Abel completed six co-op sessions at the Air Force Research Laboratory (AFRL) at Wright Patterson Air Force Base. “Working at AFRL was an excellent opportunity to be exposed to research very early in my education. I processed and characterized high-temperature superconductors for use in developing superconducting generators. While I enjoyed conducting research, I was more interested in developing the technology to change the shape of wings. “ Abel’s graduate research demonstrated the potential of the active knitted actuators for the creation of novel architectures for the creation of novel actuator platforms and allow aircraft to efficiently maneuver over a wide range of flight regimes. Abel’s graduate research demonstrated the potential of the active knitted actuators, but more research is needed to fully develop the technology.

When Abel joined the Mechanical Engineering Department at the University of Minnesota she was hired as part of the MnDRIVE RSAM (Minnesota Discovery, Research, and Innovation Economy) initiative. “I am excited to be a part of a distinguished faculty with diverse research interests, and I’m looking forward to the opportunity to collaborate with faculty across the University.” Abel will not only be collaborating with faculty, but she is excited to work with graduate and undergraduate researchers, and is currently recruiting students to be a part of her research group. Abel is developing a research lab that focuses on establishing frameworks to design and synthesize smart material technologies to enable new applications. Abel is enthusiastic about teaching a range of undergraduate and graduate design courses as well, and is eager to teach Design and Manufacturing II in the fall.

When she’s not conducting research, Abel enjoys going the gym, running, playing volleyball, and knitting. She loves spending time with her husband, Josh, and playing with her cat, Ginger. Having lived in the Midwest her whole life, she enjoys all four seasons. “I was a little disappointed in my first winter in the Twin Cities as I was hoping to take up cross-country skiing but never had enough snow to do so.” Abel is looking forward to a beautiful summer so she can enjoy all the outdoor activities Minnesota has to offer.

Because of her passion for research, Abel decided to pursue a Ph.D. in Mechanical Engineering at the University of Michigan where she was co-advised by Professor Diana Brei and Dr. Jesus Luna in the Smart Materials and Structures Design Laboratory. Her graduate research was on Active Knitted Actuation Architectures, which was a great research topic for Abel because it integrated many of her interests into a single research project. “From a technical perspective I was able to design with a novel material – shape memory alloys – by incorporating principles of design, mechanics, materials, and manufacturing. The project also gave me the unique opportunity to integrate one of my hobbies, knitting, into my research.” Abel’s research investigated how the knitted architecture leveraged the foundational smart material to create unique and dramatic shape changes. While the morphing structures she produced could be used for a broad range of applications, her graduate research was funded by the Air Force.

“The Air Force was interested in the active knitted actuators as an enabling technology to change the shape of wings from a mid-flight to expand the operational platform and allow aircraft to efficiently maneuver over a wide range of flight regimes.” Abel’s graduate research demonstrated the potential of the active knitted actuators, but more research is needed to fully develop the technology.

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“"My interest in spaceflight sparked my desire to become an engineer, which led to my pursuit of a mechanical engineering degree." —Juliana Abel
This list reflects contributions to the department since April 1, 2014. Bold names denote Dean’s Club members who donate $1,000 or more each year to education more accessible to ME students. For many years, Kurt and his wife Polly have contributed to the students. Since the age of eight, 1988 alum Kurt Brungardt knew he wanted to be a mechanical engineer. "I took apart my first bike on my eighth birthday and put it back together before ever riding it," he said. "I was constantly modeling, working on cars, and rebuilding engines." His passion for automotive and mechanical work was reflected in his studies at the University of Minnesota in the Department of Mechanical Engineering. “I was a member of the Society of Automotive Engineers and was very active in that program,” he said. "Professor Murphy fueled my interest in engines." During Brungardt's time in the ME Department, he became interested in electronic control systems. When he graduated in 1988, he moved to Connecticut to work for General Dynamics in their Electric Boat Division helping make submarines more difficult to detect in battle.

"They had a new class of submarine technology that required experience with mechanical and electrical engineering combined with experience in control theory," he said. "It was a wonderful mix of complex problems requiring multi-disciplinary engineering to solve."

After seven years at General Dynamics, he then went on to work for Noise Cancellation Technologies, Inc. in Maryland doing active noise control. Essentially, he was developing passive noise control systems to make them quieter. He headed the engineering department and ultimately became the CEO until a firm in Manhattan bought the company.

In an interesting twist, 14 years ago Brungardt was hired by MSD Capital on Wall Street, an investment fund founded by Michael Dell of Dell, Inc. to manage the Dell wealth. "When I was at Noise Cancellation Technologies, we were collecting, manipulating and interpreting complex information to anticipate the failure of very expensive industrial equipment. The insights we gained were managing very important to Wall Street executives looking to apply these techniques to their investment selection and risk management processes," he said. "I don't know how many times I had to bridge these two areas and I was able to use my experience and apply it to investing." Brungardt left his role as MSD Capital as Chief Information Officer in January of this year and now investing in profitable, early stage companies that need capital and the help of experts with an experienced strategy advisor. In this new venture, he is able to apply much of his broad and varied experience to help companies effectively manage risk and accelerate their growth.

Brungardt credits much of his success to the challenging programs and the accomplished professors at the University of Minnesota that helped him discover and develop his passion for engineering systems to make them quieter. He headed the engineering department and ultimately became the CEO until a firm in Manhattan bought the company.

Although he has resided on the East coast for more than 25 years, he still remembers his alma mater. For many years, Kurt and his wife Polly have contributed to the Brungardt Family Scholarship, a dedicated fund to help students make this outstanding education accessible to more ME students.

"All of my parental family has attended the U of M and my wife and I are both passionate about the power a great education can have. We think that the University of Minnesota provides world class education that is multi-cultural, national and globally," he said. "Education leads to a better world and funding a scholarship for the University of Minnesota is one of the ways we contribute."
UPCOMING EVENTS:

Homecoming 2015 - 9/20-26/15        Robot Show - 12/14/15        Senior Design Show 12/15/15

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