

UND ENGINEERING

2020 \\\\\\\\\\\\\\\

CHEMICAL | CIVIL | COMPUTER SCIENCE | ELECTRICAL | GEOLOGY | GEOLOGICAL | MECHANICAL | PETROLEUM



31

**YEARS OF
ONLINE
& DISTANCE
EDUCATION**

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PRESIDENT ARMACOST**
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IN ENROLLMENT
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DISTANCE EDUCATION
HELPS CEM SUCCEED**
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UND ENGINEERING

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DEAN

Brian Tande
College of Engineering & Mines

EDITOR

Deb Austreng
Director of Alumni, Corporate,
& Public Relations

CONTRIBUTING WRITERS

Deb Austreng

Tom Dennis

Sydney Mook

Connor Murphey

Jan Orvik

Dima Williams

PHOTOGRAPHY

Deb Austreng

Arianna Bray
Graphic Design Intern

Jordan Eberhardt
IT Specialist

Paige Prekker
Graphic Design

Caleb Wilkinson
Electrical Engineering
CJW Films

GRAPHIC DESIGN

Paige Prekker

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LETTER FROM THE DEAN

Hello Alumni and Friends,

It was an incredible honor to be named as the next Dean of the College of Engineering and Mines this past spring. I consider it a privilege to lead a college that does so many important things and holds such a special place in the hearts of so many people.

After serving as Interim Dean for a little less than a year, I thought I would be well prepared for this job. But of course I didn't anticipate a pandemic would come along and completely change the face of higher education, perhaps permanently. But as universities around the world scrambled to adapt, I felt CEM was better positioned than most to deal with this situation. For that I have to thank those who helped to create and maintain our student-focused culture and those who had the foresight to invest in distance education some thirty years ago. More than anything else, those two factors allowed us to continue to serve our students in the best way possible despite the circumstances.

As you will read in the pages that follow, not even a pandemic could slow down CEM this year. Our students, faculty, staff, and alumni continued to do great things and make positive impacts on the University, the State, and the World in a number of ways. We certainly had challenges this year, but we faced them like engineers and scientists: by solving problems and finding creative solutions under a new set of constraints.



One effect the pandemic did have was to expose certain inequalities among our students. I was continually impressed by the resilience shown by our students, but I was also reminded how many students rely on resources available on campus—computer labs, internet access, employment opportunities, safe and affordable housing, etc. It is clear that some students have been disproportionately affected by the pandemic. This is why the UND Alumni Association and Foundation has created the “Open Door Scholarship” to help these students return to UND to finish their degrees. I hope you will consider joining me in making a contribution, which will be matched equally by funds from the UNDAAF and a generous CEM alum. To learn more, please contact our Director of Development, Robin Turner (Robint@undfoundation.org, 701-739-3211).

I hope you enjoy this year's magazine. Best wishes and stay safe!

Brian Tande, Ph.D.
Dean | UND College of Engineering & Mines

MESSAGE FROM THE EXECUTIVE BOARD



TERRY SEVERSON
BOARD CHAIRMAN

It's been a year of change in our 8th year of operation for the CEM Executive Board: first the transition from Dean El-Rewini to Acting Dean Tande, then to Dean Brian Tande, and then to a virtual Zoom Spring Executive Board Meeting rather than our usual face-to-face Spring meeting in the Twin Cities area. And, of course, UND will have a new President and a new Provost. The Board has also transitioned our mode of operation from four standing operating committees to a more dynamic and focused series of Task Force Topics, some of which we work and close out over 6 to 12 months, some of which continue longer. Our objective, however, remains constant—to stay continuously engaged with the Dean, faculty, staff, and student leaders to provide real value to CEM, UND, and their wider community and state constituencies.

In his remarks at our Spring meeting, Dean Tande raised several questions about potential new paths and approaches for CEM going forward. Each reflects his thinking that future CEM success is going to depend on necessary and effective changes in approach and structure—that the current traditional academic model will not be successful in the changing US higher education environment. COVID-19 precipitated shutdowns of on-campus classes and activities and 100% online learning have accelerated consideration and likely adoption of those changes for CEM as well as UND and virtually every other university. In fact, the Dean had been considering needed changes before COVID-19. Examples include evaluating wider CEM partnerships with other schools or with a consortium of small private schools (i.e., leveraging CEM's favorably recognized Distance Learning

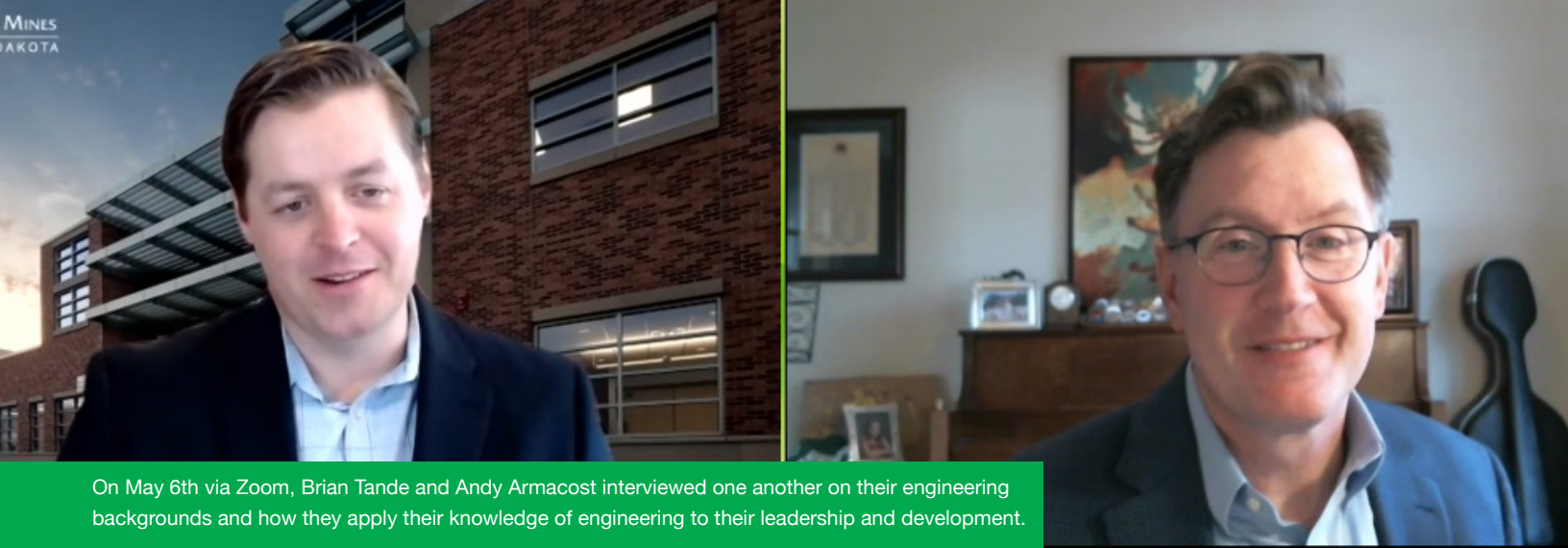


STEVE BURIAN
BOARD VICE CHAIRMAN

programs with smaller schools who want to offer their students engineering educations but can't afford to establish those programs from scratch), new CEM programs, and certificates and other non-degree credentials valued in industry. Board members are contributing their varied experiences to aid Dean Tande and CEM faculty evaluation of those initiatives.

It's been interesting and rewarding to see and help the development and growth of the School of Electrical Engineering and Computer Science (SEECs) under Ryan Adams' leadership, as well as Petroleum Engineering's acquisition and installation of the world's largest—and only—full scale oil drilling and completion lab under Vamegh Rasouli's leadership. There was tremendous positive momentum building in CEM pre-COVID-19. It was highly rewarding for Executive Board members to be involved, even peripherally, in those initiatives and efforts.

Now, still in the midst, hopefully the beginning of the end, of the COVID-19 pandemic, it will be crucial for Dean Tande and his leadership team to make the right decisions to limit the damage from the on-campus closures while setting the stage for resumption of CEM growth. Board members will have an opportunity to offer their lessons learned and insights gained through dealing with positive and negative business cycles for the CEM Leadership Team's consideration. The months and years ahead will be challenging, and Board members will have an opportunity to contribute individually and in teams toward a positive CEM outcome.



On May 6th via Zoom, Brian Tande and Andy Armacost interviewed one another on their engineering backgrounds and how they apply their knowledge of engineering to their leadership and development.

ENGINEER TO ENGINEER

A conversation between Brian Tande, dean of the UND College of Engineering & Mines, and Andy Armacost, incoming president of UND

BRIAN TANDE: So, the first question I have is just, what got you interested in engineering? And what was it that led you to pursue an engineering degree?

ANDY ARMACOST: As a kid, I didn't know that I had an engineering mindset. In fact, I thought an engineer was somebody who drove trains. But I was always a very curious kid, trying to figure things out and how things worked. And it turns out, I was really good at math too.

Those two things naturally, for many people, point in a certain direction. And engineering is one of those directions that people with that type of background might head.

It turned out that my father had an engineering undergraduate degree and two graduate degrees in a field called operations research, which is owned partially by engineers. It's an interdisciplinary field. They deal with quantitative modeling. So that is my dad's background. My brother went to college two years before I did, and he was a mechanical engineer.

And so, between the two of them, I said, "Wow, this engineering thing seems to be pretty cool. Tell me more." My dad asked me a bunch of questions, and after just observing me over my entire life said, "You know what type of engineer I think you should be? You should be an industrial engineer." That's a field of engineering that traditionally focuses on how you make production systems and plants

more efficient through quantitative modeling, process flow and things like this.

So, I chose industrial engineering, which can be applied to production systems, to transportation systems, to human systems. And I just I found it to be perfect for my interests.

Again, the quantitative basis that I had coming into college served me well as I went through a really good engineering program.

TANDE: That's great. I'd say for me, the story is pretty similar. My dad wasn't an engineer; he actually was an electrician. But I always thought that he would have made a really good engineer. He liked tinkering with things, he liked building things – he built his own power equipment/power tools for his shop. And he always kind of pointed me in that direction.

So, the same with me, I enjoyed math and science; and those students, they tend to steer towards engineering.

But to be honest, I didn't know exactly what I was getting myself into. I thought about electrical engineering, which would be more aligned with what my dad's interests were. But I really enjoyed materials, and eventually chose chemical engineering and focused my career more on materials science.

ARMACOST: I used to joke that I could have been a good electrical engineer, except I'm left-handed, so I'd always screw up the Right-Hand Rule. All my answers were negative.

TANDE: (laughs) Well, that's just a sign error; that's no big deal.

ARMACOST: "Just" a sign error. Half off.

TANDE: Except when you're dealing with budgets. Then it's a major problem.

ARMACOST: (laughs) True. But it turns out, there's an advantage to being a lefty in double E, and that is, you can actually do the Right Hand Rule without having to put your pencil down. So there is an advantage.

TANDE: (laughs) That is good.

So your career has – you've had a diverse background, both academically and professionally. And so, being an engineer as an undergrad, and then transitioning into doing more operations research and then becoming part of a Department of Management in part of a business school: I found that interesting, especially because a lot of engineers – a lot of our alumni that I speak to – start off as engineers in a technical role and eventually move into management where, you know, the systems that they're working with are now people in organizations.

For some people, that's a natural transition. For others, it's a little more difficult. I'm curious to get your take on that, and maybe what advice you have for engineers – maybe engineering students – who are thinking that eventually, they want to be more into management.

ARMACOST: Yes, it's interesting. I think many of the attributes that engineers have translate really nicely to management and leadership roles.

But you're right: what separates engineering systems from human systems is the element of human behavior and unpredictability. And so, often we go from a deterministic system – at least, many undergraduates feel it's deterministic where your engineering has nice, clean answers; in practice, it's not quite that way. But at least in the classroom, sometimes you solve a problem and you get the right answer.

But when you're dealing with human systems, there are emotions, there's unpredictability, there's just this dynamic component that's quite a bit different.

I think the background that engineers bring to those systems, if they're willing to make that jump and recognize and be comfortable in that uncertainty, the things that engineering brings are essential to being successful in that environment.

What comes to mind are things like being able to plan effectively. Good engineers, I think, are excellent planners. They think through problems, and they can think through a logical set of steps to get from the beginning to the end.

They can take systems that are somewhat unstructured and put some structure around them. And so that, I think, serves leaders very, very well.

But there has to be this propensity to make the jump to the world of the uncertain.

I also think about comfort with data. In leading most organizations these days, when we talk about organizational performance, we often talk about the data or the metrics that we use to judge ourselves. So, being facile with data and being able to analyze data and interpret data, I think is an important component of leading and managing effectively.

But there's also a downside data as well. And I think engineers, if well trained, will understand that – that there are limitations to the models and the mathematics that we use in our engineering systems, and that understanding those shortcomings and the limitations, the assumptions that you put into the models, is really important as well.

Because as a leader, as a manager, you'll be presented with a lot of data and models from people who work for you or work with you. You have to recognize: OK, what are the limitations of this approach? And I think engineers can do that very well.

So, there are a lot of experiences that engineers can capitalize upon, when they move into the world of leadership and management.

In terms of specific advice. I think it's important for our young engineers, in companies or working at universities or wherever else, should really study the human element of their organizations. Don't shy away from understanding good communications and good ways to articulate your great ideas.

And how do you sell those ideas? Furthermore, how do people respond to the incentives that you give them?

So, paying attention to that early on, I think, is really important.

It's fascinating, actually. I've got friends who have gone from the engineering and the physics world into the worlds of – believe it or not – sociology and psychology. It's just been their natural progression, because the cause-and-effect-type work they do as engineers translates really nicely to experimentation on sociological systems and psychology.

So there's really a great connection.

I think what really serves engineers well is there's this natural curiosity to solve problems. Engineers are problem solvers. And so, stepping into a world where the problems are ill-defined and the responses from the human beings are unpredictable, actually make it something that's really worth studying and really exciting – and in some ways, harder than engineering systems, just because of the unpredictability.

So I think that sense of hope, that sense of optimism, that sense of innovation that engineers can have – I mean, think about it: if you have Capstone students who are struggling and repeating and failing, and failing, and persevering, those are the same types of characteristics that we need in our leaders and managers.

I think our engineers are in a great place to be effective in all parts of an organization.

TANDE: That's great. I try to emphasize with our prospective students and our current

students, the need to really focus on the human aspect of engineering. I think a lot of a lot of people are drawn to engineering without really fully understanding how important the human side is.

You know, when I talk to our alums and I ask them, "What are the things that you wish you would have learned more of as an undergrad?" Usually, it's those types of things – learning more about communication, about teamwork, maybe about psychology and sociology and the like.

Because they understand, once they've been in the field for a while, that the human side of things is absolutely just as important as the technical side and in some cases, more so.

ARMACOST: Sure. And that's giving rise to new forms of design. In the Air Force, for example, we used a very structured approach to designing our engineering systems: preliminary design reviews, critical design reviews, and then finally, you get to start building something.

But human-centered design has now come to the forefront. And how do you actually focus not just on the technology, but also on the human use? How does the human element drive the designs that you're creating?

So, for an engineer to gain that perspective that you're talking about – how to understand how humans are going to interact with the things that we're building – is a really important component.

At my alma mater, they have a trademark phrase; it's called "whole-brain engineering." What it recognizes is that the analytic piece and the creative piece can work side by side to generate some really cool solutions. And at UND, we aspire to do the same thing – to really tie the sides of the brain together to create great engineering designs.

TANDE: Good. So, in terms of your approach to management and leadership, I'm curious how you've had to adjust things as you've gone from managing a small group of people to managing a larger enterprise to now being president of the university.

What are the adjustments in the way that you operate, if there are any that stick out to you?

ARMACOST: Right. Considering the transition from small groups to bigger groups to bigger groups, the biggest thing is just the general

sense of responsibility that you have when you go from a group of 10 people to 100 people – and now in my case, I guess we’re upwards of 20,000 people (at UND), between the students, the faculty and the staff. That can seem a little overwhelming.

So the key, at least for me, has been to preserve the characteristics that I thought I brought to the small group, and try to transfer them somehow to the bigger group.

I think one area that I’ve really focused on is interpersonal communications and really making an effort to get to know the people.

Now, with 20,000 people on campus, of course, I’m not going to have close personal relationships with everyone. But there are things I can do just in the way that I approach my daily work and my interactions with the campus that signal that same desire.

So, although I won’t have that close, interpersonal relationship with all 20,000, hopefully what they will get is a sense of the fact that that’s who I am as a leader, and it’s how I expect people on campus to be – caring and compassionate for one another, and looking out for everybody’s needs.

In other words, what I’ve tried to do is scale up these personal characteristics that I think have served me well, and scale them up in a way that translates to that bigger setting.

TANDE: Right. And that really touches on what is the culture of the overall organization in a way.

I think I read in an interview with you that was one of the things that you hoped to focus on, was the culture at UND – maybe defining it, defining what our values are, and making sure that how we operate aligns with those values.

ARMACOST: Right. So, culture on campus is going to be a top priority. Of course, it’s facing a really stiff challenge with the COVID pandemic; how do you carve a culture at a time when the campus is on edge about personal safety, and also about the financial future of the college? So this will be a real challenge, but one that I’m looking forward to.

TANDE: I’m looking forward to our being a part of that as well.

Within the College of Engineering, we’ve been talking quite a bit about culture, and we’ve been having some interactions with our alums who work for large organizations that have gone through a culture shift or at least a process of defining what is the culture that they want to encourage within their organization.

We hope to bring some of those elements to it to the College of Engineering, and they’ve obviously aligned with what’s going on at the university as a whole.

ARMACOST: That’s wonderful. That’s a great initiative. And you’re right: building culture within an organization is a challenging step, but one that you can deliberately take steps to do. I know the College of Engineering & Mines is going to do a great job there.

TANDE: It’s interesting. You don’t really think of “culture” as a process, but like you said, there is a process that you can go through to define and reinforce a culture.

ARMACOST: And of course, process doesn’t always yield the perfect outcomes, right? That’s where leading humans is a fun art, that’s for sure.

TANDE: Right. Now, of the aspects of management and leadership that you mentioned, which do you think are most important – especially in a time like this, during a crisis?

ARMACOST: So, there’s probably a blend of process issues and then personal issues; and the personal issues, I think, are probably the most important at a time like this.

I think a leader should have a calming and yet optimistic look for the organization – or in this case, for the campus – and really be open to share their ideas about how we’re going to get from the tough times to the better times. That sense of optimism, I think, is really a key component.

I think there’s an element of trust; and trust built during the good times always translates nicely to the tough times,

because establishing that relationship and that sense of trust allows an organization to look at its leaders and say, “Aha! We know the leaders have our best interests at heart, and we will follow them. We will help the organization get through by following that direction, and of course, asking questions and offering suggestions along the way.”

But I think that sense of trust needs to be built in order to handle the tough times more effectively.

And then for an organization that’s going through something like COVID, having a good plan – and really executing the plan, but being flexible because you don’t know the direction that the virus is going to go – is important, and articulating that plan and being open and communicating it is important as well.

So there’s a blend of personal characteristics, but also having a good process in place and a focus on those processes that I think will really carry an organization through tough times like the ones we’re facing right now.

TANDE: There’s a quote I heard recently – I think it was from Napoleon – that says, “A leader is a dealer in hope.” I don’t know if I got it right; but it came from a military general, and it was something that he had highlighted in a presentation that I watched online recently. And I thought that really translated well to what we’re doing now and to your first point about optimism.

You have to present that there is a light at the end of the tunnel; there is something that is worth moving towards.

ARMACOST: Right. And we’re going to get you there. We’re all going to get there together, is the idea. Optimism, I think, is a real key to this.

TANDE: Good. Well, those were the main points that I wanted to hit. I really enjoyed your answers, and I appreciate your time!

ARMACOST: Anytime, Brian! Thank you!

Transcribed by Tom Dennis
Editor, UND Today

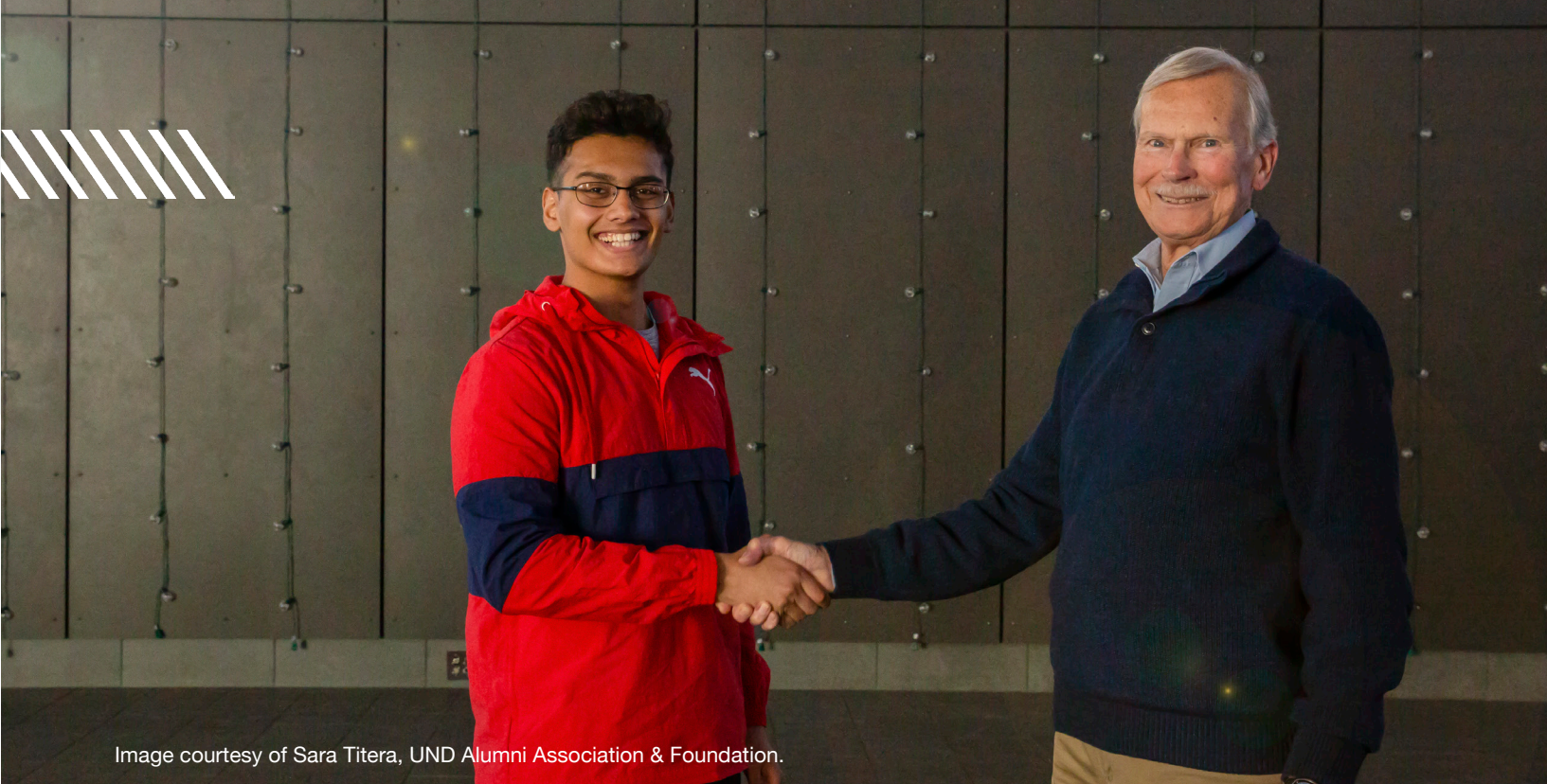


Image courtesy of Sara Titera, UND Alumni Association & Foundation.

PASSING THE TORCH

Together, we set fire to the future.

Until recently, they only knew each other on paper. A face-to-face meeting connected UND junior Shahmeer Kanwar, '21, to his scholarship donor, Terry Severson, '65. Both call Western North Dakota their home and chose to pursue electrical engineering at UND.

In 2017, Severson and his late wife, Diane, established an endowment at UND. Their investment is supporting scholarships for students like Kanwar.

“I’m a big believer in the small things,” said Kanwar, who is also a Grand Challenge Scholarship recipient. “If I didn’t have these scholarships, I’d have to worry about having money for the next week for groceries or next month for rent.”

The electrical engineering/pre-med major hopes to become a surgeon or create medical devices to improve patient health.

A former UND football player and retired Air Force colonel, Severson spent the last 14 years helping build Trace Systems Inc., a telecommunications business that supports the U.S. Department of Defense that employs more than 300 people around the world. Severson is also a founding member of the

CEM Executive Board, which he has chaired since 2014. This fall, Severson will be recognized for his achievements, service, and loyalty as a 2020 Sioux Award recipient, the highest honor given by the UND Alumni Association & Foundation.

“I’m at a point in life where I can offer some help to people who are starting out and dreaming of things that I can’t even comprehend,” said Severson, who has helped create several scholarships for engineering students.

He referred to these scholarships as “passing of the torch” in hopes that, one day, students like Kanwar will pay it forward.

Written By Jenn Lukens
UND Alumni Association Foundation

CEM ACADEMY INDUCTION HOMECOMING 2019



RETURNING CEM ALUMNI ACADEMY MEMBERS
Front Row: Mark Bittner, Lisa Barnes, Al Hopkins, Arlen Nordhagen, Dale Hartz, Sherri Bonacci
Back Row: Gary Hartz, Mike Lodoen, Terry Severson, Everett Sondreal, Tom Hamilton, Tom Owens, Steve Burian, Dean Wieland



2019 CEM ALUMNI ACADEMY INDUCTEES
The College of Engineering & Mines welcomed three new alumni to the Alumni Academy: (left to right) Allan Hopkins, Arlen Nordhagen, and Dale Hartz. They were honored at a luncheon and ceremony in October.

CEM ACADEMY INDUCTION: HOMECOMING 2019

DALE E. HARTZ CLASS OF 1984



UND College of Engineering and Mines
ACADEMY
Dale E. Hartz
Born: October 13, 1961, Cavalier, North Dakota
Education: University of North Dakota, BSME, 1984
Defense Acquisition University, Fort Belvoir, VA
Program Management, PMT401, 2010

Career Experience
32 Year Career - The Boeing Company, Seattle, WA
1984-1990 Materials and Process Engineer & Research Lab Lead, Advanced Tactical Fighter Program
1990-1992 Project Lead, Fusion Welding & Repair of Composites Program
1992-1998 Lead Engineer, F-22 Material & Process Technology
1998-2003 Manager, F-22 Parts, Material and Process Technology
2003-2003 Mid-Level Manager, F-22 Air Vehicle Technology
2003-2006 Senior Level Manager, F-22 Deputy Air Vehicle
2006-2009 Executive Director, F-22 Air Vehicle
2009-2016 F-22 Chief Engineer & Director Avionics Modernization

Awards
Special Invention Award, 2 Patents recognized by Boeing out of the top 25 Inventions (1997)

Numerous Commendable/Outstanding Performance Awards - Development of Honeycomb Structure, Aluminum Tube Welding, Thermoplastic Fusion, Resin Transfer Molding of Sinewave Spars, F-22 Material Readiness Document

Recognition
Inventor of 5 US Patents, The Boeing Company
Selected to present IR&D Project to Corporate Technical Advisory Council & Industry Leaders
Led the development of Bismaleimide Sandwich Structure - 2 Patents. Aircraft Weight Savings
Special Department of Air Force Recognition for F-22 Life Support System Investigation



Dale Hartz and wife Kay with family and friends.

W. ALLAN
HOPKINS
CLASS OF 1962



UND College of Engineering and Mines
ACADEMY
W. Allan Hopkins

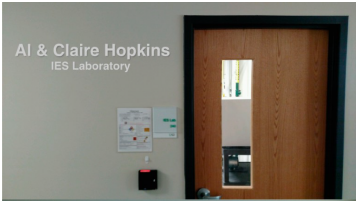
Born: December 2, 1938, Calgary, Alberta, Canada
Education: University of North Dakota, BSCE, 1962

Career Experience
1962-1992 Multiple Positions, Stelco, Inc., Hamilton, Ontario
1988-1990 Vice President of Sales, Stelco, Inc.
1991-1992 Senior Vice President, Stelco, Inc.
1993-1996 President & CEO, Algoma Steel Inc., Sault Ste. Marie, Ontario
1998-2000 President & CEO, Atlas Steels Inc., Mississauga, Ontario

Corporate Boards of Directors (1990-2010)
Algoma Steel Inc., Canada
Atlas Steels Inc., Canada
Camrose Pipe Company, Canada
Citation Metals Corporation, USA
Copperweld Corporation, USA
Intermetco Limited, Canada
Novamerican Steel Inc., Canada
RaiLink, Canada
Stelco SA, Switzerland
Tiercon Industries Inc., Canada

Industry Affiliations
American Iron & Steel Institute
International Iron & Steel Institute
Specialty Steel Industry of North America
Steel Service Center Institute

Volunteer Service
Ontario Neurotrauma Foundation,
Executive Committee
Canadian Paraplegic Association



The AI & Claire Hopkins IES Laboratory is located in the Collaborative Energy Complex.

Allan Hopkins with wife Claire, daughter Jill, and other family and friends.

ARLEN D.
NORDHAGEN
CLASS OF 1978



UND College of Engineering and Mines
ACADEMY
Arlen D. Nordhagen

Born: October 24, 1956, Crosby, ND
Education: University of North Dakota, BSChE, 1978
Summa Cum Laude
Harvard Graduate School of Business
Administration, MBA, 1983
Magna Cum Laude

Career Experience
1978-1980 Process Engineer, DuPont Company, Wilmington, DE
1980-1981 Business Analyst, DuPont Company
1982-1982 Business Consultant, DuPont Company
1983-1985 Sr. Production Supervisor, DuPont Company
1985-1986 Product Manager, DuPont Company
1986-1988 V.P. Business Development, Synthetech, Inc, Boulder, CO
1988-1993 V.P., Principal, American Business Advisors, Englewood, CO
1993-1999 Founder & CEO, Nord Capital Group, Lone Tree, CO
1999-2013 Co-Founder, CEO & Chairman, SecurCare Self Storage, Lone Tree, CO
2013-Present Founder, CEO & Chairman, National Storage Affiliates (REIT), Greenwood Village, CO

Achievements/Accomplishments
Completed Initial Public Offering on the New York Stock Exchange – 2015 (NYSE: NSA)
Founder & President – The Nord Foundation (1996 – present)
Co-Founder & Treasurer – MMM Healthcare, Puerto Rico (2000 – 2005)
Founder & Principal of more than a dozen real estate and investment companies in past years
Current Director – Axion Healthcare, Inc. and ALN Medical Management, Inc.
Current Trustee – Denver Seminary
Private Pilot

Honors/Awards
Ruling Elder – Parker Evangelical Presbyterian Church, Parker, Colorado
Past Moderator – Presbytery of the West, Evangelical Presbyterian Church
Harvard Business School – George F. Baker Scholar
National Merit Scholar
U.S. Presidential Scholar



Arlen Nordhagen with wife Wendy, Dean Brian Tande, and Dr. Frank Bowman, Chair of Chemical Engineering.



Ceremony honoring Tom & Carolyn

2020	15
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UND ENGINEERING GROWING IN ENROLLMENT & COLLABORATIONS

Enrollment in UND’s College of Engineering and Mines is on the rise, as are cross-campus collaborations.

Total headcount for CEM was 1,889 students in the fall 2019 semester. It eclipsed the aerospace school by about 100 students this year and is now the second largest college behind UND’s College of Arts and Science.

But dean Brian Tande says there’s still room to grow and collaborations to add.

The college is involved with many aspects of campus, said Tande, who took over leadership of the college following the departure of Hesham El-Rewini. Engineering students and faculty assist the aerospace school with UAS research and help the Energy and Environmental Center with energy-related projects.

Tande said he wants to continue to grow those collaborations.

“Gone are the days where UND consisted of a bunch of silos, and now it’s all about collaboration,” he said.

That collaboration stretches beyond just working on research together and is now going into data science.

“We’re trying to really raise the profile of data science at UND and within this region,” Tande said. “And we’re doing that with a conscious effort to include all parts of campus.”

Earlier this year former UND President Mark Kennedy announced that UND would be investing a total of \$10 million over the next six years in the College of Engineering and Mines, specifically for a Computational Data Science Initiative. The initiative will be led by Ryan Adams, director of the School of Electrical Engineering and Computer Science at UND.

The money will supplement college resources to hire new computational scientists. The new hires are intended to bolster the university’s standing in future-facing technologies, such as artificial intelligence, machine learning and cyber studies, technologies vital to the state’s economic health.

The investment over six years is more than just salary and benefits for the scientists. Each will come with expertise and resources to apply computational expertise to research in all fields across campus as well as provide fertile ground for more post-docs, doctorates and funded research opportunities.

The college’s biomedical engineering department recently made a joint hire with the UND School of Medicine and Health Sciences to do bioinformatics, which includes data science applications. While Tande said he’s not an expert in the field, the hire does research

“We now have access to so much data, it’s very, very difficult to sift through it all. There’s just too much information to digest at one time. So, we go to trusted sources that give us data that ... I can interpret.”

RYAN ADAMS | DIRECTOR OF SEECs

related to machine learning and deep learning to try and detect cancer. The college also made a joint hire with the EERC.

“We’re trying to identify other areas where there’s a common need,” Tande said.

Experts in big data are needed now more than ever as computing and data continue to advance, Adams said.

“You can only go so far when you’re an expert in the medicine,” he said. “You can only go so far with the computing stuff on your own and often you need that support from an expert that really understands the computing.”

Adams notes that the concept of “big data” and computational science can be difficult for a lot of people to understand. But as the internet has become more and more vast, the amount of data available is endless, Adams said.

“We now have access to so much data, it’s very, very difficult to sift through it all. There’s just too much information to digest at one time,” he said. “So, we go to trusted sources that give us data that ... I can interpret.”

Adams likened the growth in data to the way a physician’s office works. A person goes to the doctor with an issue, the doctor runs a bunch of tests, or “data,” that all work together to provide a diagnosis.

Now, the physician’s office takes that data plus the data of hundreds or even thousands of patients to better interpret what the likelihood is of people developing certain diseases and what treatments are available and best suited to treat those patients.

That’s where data scientists and data experts step in, to help interpret that data to better inform doctors and the public. The same sentiment can be applied to countless other applications.

Adams said UND has the resources — with its number of colleges and schools, such as aerospace, medical and energy, active researchers and physical space — to bring data research into the fold and “contribute to the advancements throughout the country and the world.”

Written by Sydney Mook | Grand Forks Herald
November 5, 2019





Vamegh Rasouli, chair of UND Petroleum Engineering, stands by the oil derrick which will soon be installed in a new drilling lab.

PETROLEUM ENGINEERING DEPARTMENT TO HOST WORLD’S LARGEST OIL DRILLING SIMULATOR

The University of North Dakota will soon host the world’s largest – and only – full scale oil drilling and completion lab.

“This drilling and completion laboratory, when fully completed, will be a \$40-million experimental facility that does not exist anywhere else in the world,” said Vamegh Rasouli, Continental Resources Distinguished Professor of Petroleum Engineering and department chair.

Petroleum engineering students will be able to simulate general drilling and deep drilling, along with testing different rocks, including shale. They will also be able to simulate oil reservoir conditions, including temperature, pressure and fluid flow. Doctoral students will be able to perform research that benefits the state of North Dakota.

“This is the only full-scale rig in the world, and it’s been used by industries worldwide for research,” Rasouli said.

After an agreement is signed, the rig will be housed inside the old Minnkota Power Plant building in Grand Forks, which has the height and space to accommodate the 26-foot-tall derrick.

Industry and other universities will be welcome to use the lab, Rasouli said, adding that the lab will also allow UND to apply for external research funding.

“For example, if a company wants to validate a bit-drilling mud design to drill in a given formation, we can conduct real, full-scale

drilling to confirm the designed rate of penetration,” Rasouli said. “There are so many applications. We can serve students, perform research and help industry.”

CONNECTIONS COUNT

The basic equipment was donated by Sidney Green, an entrepreneur, founder/president of Enhanced Production, Inc. in Salt Lake City, Utah, and a research professor at the University of Utah. Rasouli said that when Green retired from Schlumberger, the largest international oilfield services company, he acquired the equipment, which was the former TerraTek Drilling and Completions Laboratory. His intention was to find a new home to reestablish this unique research equipment.

Green said he considered a number of research universities, national laboratories, and international companies, but after visiting with Rasouli, he was convinced that the University of North Dakota was the right location.

“A lot of universities are disappointed they didn’t get this lab,” Rasouli said.

The only problem was transporting it from Utah and finding somewhere large enough to install it.

It cost about \$100,000 to move the lab to North Dakota, Rasouli said, and the old Minnkota Power building is one of the few structures with the height to accommodate the derrick.



Vamegh Rasouli, Petroleum Engineering Chair & PE student Adam Husting were interviewed on the North Dakota Today show on Valley News Live.

The new lab will join 10 existing labs in the department, including a smaller-scale automated drilling rig simulator, a “conventional” drilling simulator, slurry loop, multiphase flow and pipeline simulation lab, and a virtual reality lab.

“UND can do things no one else can,” Rasouli said. “We’re working to simulate horizontal drilling, simulate fluid movement into the rocks and its transportation to the surface. All our labs were built in the last three years, and we’re running out of space.”

STATE SUPPORT

The North Dakota Oil & Gas Research Council and the North Dakota Industrial Commission voted to approve \$2.78 million in financial support over three years. Additional funds are expected from industry and governmental research to support students and laboratory development.

“Without the support of the Research Council and the Industrial Commission, as well as the UND Energy & Environmental Research Center, it would be very difficult to continue all our programs,” Rasouli said. “All of this support and encouragement is key.”

“Our mission is to educate hands-on and practical petroleum engineers who can work in the state’s oil and gas industry with a minimum of on-the-job training. We also perform practical research to help industry solve drilling problems, mainly in the Bakken.”

UND’s petroleum engineering program began in 2010 in response to demand for engineers in the Bakken Oil fields. A doctoral program began in 2016 to fill oil and gas research needs. UND’s Energy & Environmental Research Center, which houses the State Energy Research Center, supports many of the petroleum engineering students by offering graduate research assistantships, as well as hiring graduates.

Petroleum engineering graduates find jobs quickly, Rasouli said.

“We produce quality undergraduates, and companies want to hire UND students,” he said, adding that the department has formed an Industry Advisory Council, comprised of more than 25 companies, that comes to campus every semester for two days to help improve the program.

“The oil and gas industry wants to hire people from North Dakota,” Rasouli said. “Our education is hands-on and practical, and we appreciate the assistance from industry. Our problem is that we don’t have enough students to supply the Bakken. If you want to be a practical engineer, UND is the place to go.”

Written by Dima Williams | UND University Letter

ACHIEVEMENTS & AWARDS

1 FENG XIAO

Early Career Award U.S. EPA STAR Program

UND Assistant Professor of Civil Engineering Feng “Frank” Xiao has been named one of only three researchers in the country to receive a highly competitive Early Career Award from the U.S. Environmental Protection Agency’s (EPA) STAR program to address a key national health-pollution issue.

The EPA, as part of its Science to Achieve Results, or STAR program, sought proposals to analyze and treat a class of contaminants called PFAS in the waste stream. PFAS (per- and polyfluoroalkyl substances) are a group of human-made chemicals that have been used for decades in many products including nonstick cookware, fast-food wrappers, stain-resistant sprays and certain types of firefighting foam.

Xiao joined the UND’s Civil Engineering Department in 2015. He earned bachelor’s and master’s degrees from Harbin Institute of Technology in China and a doctorate from the University of Minnesota, all in Civil/Environmental Engineering. This is his second federal award this year.

3 NIDHAL BADROUCHI

Graduate Research Achievement Day 1st Place Winner

The Graduate Research Achievement Day (or GRAD, for short) is a one-day celebration of our graduate students’ work over the past academic year. Students presented their work in a poster-format and were judged by faculty. Cash prizes were awarded to those students whose work and presentation were deemed best. This year, Petroleum Engineering Ph.D. student Nidhal Badrouchi came in first place with his presentation: “Evaluation of CO₂ Enhanced Oil Recovery Potential in Bakken”.

2 SUROJIT GUPTA

Young Professional Award American Ceramic Society

Surojit Gupta, associate professor of mechanical engineering at the University of North Dakota, has received the 2019 Du-Co Ceramics Young Professional Award from the American Ceramic Society.

Gupta is an active researcher in sustainable materials, high temperature ceramics and alloys, nanotechnology, additive, and green manufacturing. He teaches fundamental and applied courses related to materials science and engineering. He holds six patents and has published more than 53 technical papers, over 90 peer reviewed abstracts and/or contributed presentations, and one book chapter.

The Young Professional Award was established in honor of the late Reldon Cooper, co-founder of Du-Co Ceramics, to recognize a young professional member of the American Ceramic Society who demonstrates exceptional leadership and service. Gupta received an honorarium check, a certificate of recognition and lifetime membership in the Society.

4 MARIE BERGELIN

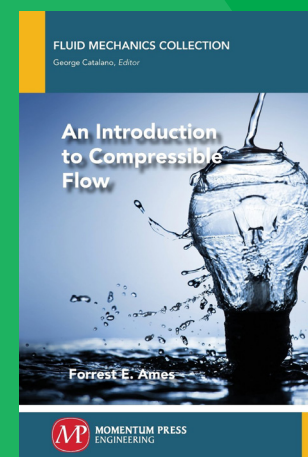
3-Minute Thesis Competition 2nd Place Winner

On Jan. 29, UND graduate students condensed years of work into a three-minute talk at the fourth annual Three Minute Thesis competition, at the Gorecki Alumni Center. College of Engineering & Mines’ student Marie Bergelin, took second-place at the competition. Marie is a graduate student in Geology & Geological Engineering.

The Three Minute Thesis (3MT) is an international competition whose goal is improving graduate students’ ability to communicate the significance and value of their research to a non-specialist, public audience, in no more than three minutes.

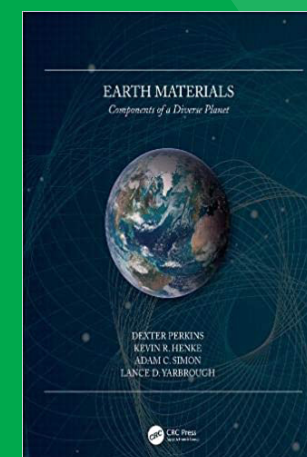


2019 FACULTY BOOK PUBLICATIONS



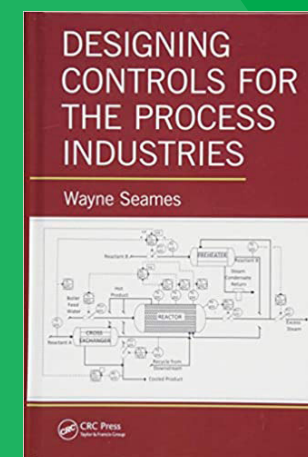
AN INTRODUCTION TO COMPRESSIBLE FLOW

Written by Forrest Ames
Professor, Mechanical Engineering



EARTH MATERIALS - COMPONENTS OF A DIVERSE PLANET

Written by Dexter Perkins
Professor, Geology & Geological Engineering



DESIGNING CONTROLS FOR THE PROCESS INDUSTRIES

Written by Wayne Seames
Chester Fritz Distinguished Professor



GEOLOGISTS FOR THREE DAYS

CEM Geology graduate students organize trip to expose undergraduates to the discipline

Marie Bergelin wanted students to come to her office: the great outdoors.

“One of the things about being a geologist is that our office is outside most of the time, we get to go out and do field work,” said the Ph.D. candidate at the University of North Dakota’s Geology and Geological Engineering Department.

So, Bergelin, together with two peers, set out to organize a field trip to introduce undergraduate students to the world of geology.

The idea also stemmed from a troubling decline in the number of students keen on studying Earth’s physical shell and the processes that shape it. The fall in enrollment figures plagues many geoscience departments across the nation, Bergelin said.

With a hands-on experience, she hoped to spark an interest in the discipline that she herself once thought to be dull, but later found riveting.

The three-day tour that Bergelin led in mid-September whisked seven students deep into North Dakota’s oil territory as well as Theodore Roosevelt National Park. Most of the students were freshmen and sophomores; several of them were enrolled in UND’s introductory geology course.

“Hopefully, by showing the students what geology is all about, they’ll get excited about it and choose it as their major,” Bergelin said of the outcome she hoped to achieve with the trip.

NORTH DAKOTA UP CLOSE

For Sarah Budziszewski, a second-year student in composite science education from Karlstad, Minn., the outing – which initially lured her with its promise of camping – presented a trove of new information.

“We did tour a lot of oil production facilities in western North Dakota,” said Budziszewski. “And I didn’t know anything about how they work. I learned a lot about subjects that I had no idea about.”

The three-day tour began with a four-hour drive to Tioga, N.D., where the group of 10 visited Neset Consulting. That’s where North Dakota State Board of Higher Education member Kathy Neset, the company’s owner and president, gave the students an overview of the Bakken’s geology.

Then the group was off to a Continental Resources oil rig and production site for a first-hand glimpse of the multi-billion dollar industry.

The other major component of the tour took place in Theodore Roosevelt National Park. The park’s northern unit served as the

group’s camping site for two nights before the members made a last-day foray into the southern portion.

In the park, which is close to North Dakota’s repository of dinosaur relics near Dickinson, N.D., the students hunted for fossils. Because the rocks and boulders that make up the region are soft clay, they cleave easily – without the need of special tools – sometimes to expose remnants of bygone eons.

“We did find some really cool fossilized leaves,” said Bergelin. “They were roughly 60 million years old. The students got very excited about that.”

Another thrilling moment had little to do with geological formations. It involved the park’s wildlife.

Saturday afternoon, the students hiked on a trail – until their single file came to a stop. At first, Budziszewski didn’t know why she was asked to keep quiet, turn around and climb up a knoll, which was still muddy and slippery from recent rains.

It turned out that two bison rested on the trail, blocking their path.

“That was exciting,” Budziszewski said.



A stop at Neset Consulting in Tioga, N.D., offered a Bakken geology lesson by owner Kathy Neset.



The students, most of them freshmen and sophomores, also toured an oil extraction and production facility.



A leaf imprint, about 60 million years old, preserved in layers of clay rocks.

PLANNING STAGE

As exciting as the trip was, its organization was quite a feat. To secure funds for it, Bergelin crafted a grant proposal to the North Dakota Oil and Gas Research Council within the state’s Industrial Commission.

After three rounds of approvals, Bergelin received \$5,300. The commission also helped arrange the tour.

“They have seen this trend of decreased interest,” Bergelin said. “So, they thought it was a really interesting project and wanted it to succeed. The commission helped by reaching out to a few people who helped us make this happen.”

Still, having received the grant in late August, Bergelin had only a few weeks to coordinate the trip with the University and market it to students, who needed to bring only a sleeping bag with them.

She aimed for 19 students; seven joined – still a good turnout, considering the short notice and the fact that the fall semester on campus teems with academic and social events.

Already planning a trip for next year, which the grant will cover, Bergelin hopes not only to attract more students to geology, but also to show what their “office” could be like if they decide to pursue a career in the field.

“When they’re out hiking or out in nature, or visiting new places, I want them to think of why Earth looks like it does,” Bergelin said. “Why do you have rivers or streams here?” And, why is the Grand Canyon where it is?

Bergelin hopes students will ponder those kinds of questions instead of just looking at a landscape and saying, ‘Oh, it looks beautiful.’”

Written by Dima Williams | UND Today



RARE EARTH PROJECT HAS NATIONAL SECURITY POTENTIAL

At one time, North Dakota’s lignite coal deposits were considered a liability because they didn’t burn “clean.” Today, they’re an asset that could lead to a new industry for North Dakota.

As the United States seeks a domestic source of rare earth elements – critical for everything from defense to cell phones – scientists at the UND Institute for Energy Studies believe they’ve found an efficient, environmentally friendly way to extract them from North Dakota lignite, which is particularly rich in rare earth elements.

The U.S. Department of Energy and other sponsors are investing \$6.5 million to fund a pilot plant to test that technology.

“This project’s goal is to create domestic sources of rare earth elements,” said Mike Mann, executive director of the UND Institute for Energy Studies and one of the principal investigators of the project. “We want to build a plant in North Dakota that commercializes the technology and benefits UND, the state of North Dakota, and the nation.”

“Rare earth elements are not made equally,” said Nolan Theaker, research engineer with the Institute, which is part of the College

of Engineering & Mines, and the project co-investigator. “North Dakota lignite has more than other coals, and we have an advantage, because it’s relatively easy to extract.”

The 17 rare earth elements are all metals, and “rare earth metals ... are used in many devices that people use every day such as computer memory, DVDs, rechargeable batteries, cell phones, catalytic converters, magnets, fluorescent lighting and much more,” Geology.com reports.

The elements “are not as ‘rare’ as their name implies,” the website continues. “However, these metals are very difficult to mine because it is unusual to find them in concentrations high enough for economical extraction.”

That’s why the days when lignite coal was sold at a discount because of its “impurities” are over. Today, those impurities add value. And as the rare earth elements are extracted, the lignite coal that’s left behind burns cleaner.

“We’ve developed a chemical process that leaves the lignite as a better fuel,” said Theaker. “Better coal fetches a premium price.”



“Research at CEM has come a long way since I joined the college in 1999. This project exemplifies how CEM’s focus on relevant applied research can and will continue to lead to commercial opportunities.”

MICHAEL MANN
EXECUTIVE DIRECTOR & PROFESSOR
INSTITUTE OF ENERGY STUDIES

A NEW SOURCE OF SUPPLY

Currently, the U.S. imports 100 percent of rare earth elements, mostly from China. Finding domestic sources is a priority to ensure national security.

“This project has the potential for a commercial plant to be built using UND technology,” said Mann. “That will benefit the state, nation, and national defense, and it could make new energy technologies available, such as electric vehicles, wind turbines and solar cells.”

The project, now in its third phase, builds on previous awards.

A 2017 award of \$2.75 million enabled researchers to scale up the lab, which was funded with a prior award. The goal was to produce a 2 percent concentrate of REE from lignite. Instead, researchers exceeded the goal and were able to produce a concentrate with 65 percent of rare earth elements and other critical materials, such as valuable germanium and gallium.

There will be more research as the technology advances.

“Right now, all the rare earths are combined into a mixed concentrate,” said Theaker. “They’re not yet refined. We want to get to a saleable product, and we can do that with strong support from industry and the federal government.”

PILOT PLANT

The pilot plant, which will be located in Grand Forks County, will be able to process a quarter-ton of lignite per hour, yielding one to two tons per year of rare earth elements, said Mann.

The process, which is both patented and patent pending, is an environmentally friendly chemical extraction that leaves higher quality lignite behind.

“We mix coal in tanks with chemicals, filter the coal out, filter the solids, rinse and repeat,” said Mann of the proprietary process.

The Department of Energy is sponsoring approximately 80 percent of the \$6.5 million award, with the remainder from partnerships with the North Dakota Lignite Energy Council and private industry, including North American Coal Corporation, Minnkota Power Cooperative, BNI Energy, Great River Energy, and Great Northern Properties.

“This technology creates a ‘value chain,’” said Mann. “It takes the lignite, extracts rare earth elements — which are of considerable value — and returns lignite that has higher value. Our goal is to commercialize the technology and get a company involved to build a facility in North Dakota. Our success will be measured by a plant that processes rare earth elements in the state.”



MAKING THE WORLD A MORE INCLUSIVE PLACE

UND students’ year-long project delivers mobility to children with developmental delays

To understand this story, one needs to know a few things about early childhood development.

“There is a huge part of child development that is based on independent mobility and the child’s access to his or her environment,” said Alicia Bullinger, a physical therapist at the nonprofit Anne Carlsen Center in Grand Forks, N.D. “So many skills are dependent on children being able to explore safely and freely.”

Toddlers learn cause and effect through their exploration, according to Bullinger. Independent mobility is a crucial cognitive stepping stone in childhood development.

And that, Bullinger said, is why the work of a small team of UND students has the potential to change her team’s work in a big way.

Bullinger is a member of an early intervention team working with infants and toddlers to deliver physical independence.

The Center, a statewide organization headquartered in Jamestown, N.D., works with people of all ages in its mission of inclusivity for all.

The students Bullinger was referring to were mechanical engineering seniors at UND’s

College of Engineering and Mines. Over the past year, they designed and fabricated a powered platform that can give young children lacking major motor skills the ability to move around in a variety of environments.

The project was part of the students’ year-long senior design project, a rite of passage for all mechanical engineering majors. Erica Eades, Conroy Unruh and John Merila worked alongside the Anne Carlsen Center to develop a pair of these devices for toddlers with developmental delays.

“When you give kids mobility, you give them independence, and then you get to really learn what their interests are,” Bullinger continued. “You get to watch them blossom.”

“I’m really excited for families to see that in their children, and for children to build their abilities in a newfound mobility.”

GOOD CHALLENGE FOR A GOOD CAUSE

After a previous internship where she assisted the development of medical technologies, project manager Erica Eades became confident in her interests in engineering. The proposal from the Anne Carlsen Center quickly went to the top of her list out of the 25-or-so projects offered by course instructor Dominik

Steinhauer, a senior lecturer in the College of Engineering & Mines.

“Working through that internship made me realize how rewarding it was to apply engineering skills to different projects that benefit human life,” Eades, a lifelong Grand Forks resident, said. “I knew this project with the Anne Carlsen Center would be a good challenge for me.”

The chance to help kids in her hometown brought a consistent excitement to the project, something that Bullinger and her supervisor, Ramona Gunderson, recognized right away.

“We’re all so pleased about how well the project went throughout the past two semesters,” Gunderson told UND Today. “The learning experience for the students and the end product for us creates a win-win situation.”

Conventionally produced mobility devices, especially for children younger than 3 years old, cost far too much for most families and facilities to access. Also, with regard to insurance coverage, most children are denied access on the basis that they’re not proficient drivers within a single, 45-minute session using one.



Due to COVID-19, Eades put the finishing touches on the mobility devices from her apartment in Grand Forks. Image courtesy of Erica Eades.

“Then parents go back to waiting for their kids to be cognitively ready for such devices,” Bullinger said. “After connecting with a professor doing this work in Michigan, producing powered devices to start working with kids on her own, we started to figure out how to bring this mobility to our early intervention work.”

That’s when the Center connected with Steinhauer, who communicates with organizations and companies to develop bonafide proposals for mechanical engineering seniors. The design projects are offered through courses Mechanical Engineering 487 and 488, providing a full academic year to develop and execute them.

“Throughout the two semesters, I teach students about project management and what their life might look like once they enter the working world,” said Steinhauer, who also serves as a faculty advisor for multiple projects each year. Senior Lecturer Dustin McNally was the advisor for the Eades, Unruh, Mirlea team. “I meet with each group at certain points in the course to get updates on projects, and then I work with the class to develop their presentations for the end of the year.”

The pair of courses is a culmination of the technical, verbal and written skills students will need as engineers in the workforce.

MEETING DEMANDS ON A BUDGET

As project manager, Eades mapped out the timeline of the project that would keep their endeavor not only on time, but within the budget offered by the Anne Carlsen Center. For \$3,000, the trio was tasked with fabricating two devices that could fit the Center’s needs. The devices needed to move at walking speeds, up to three or four miles per hour, and come

with interchangeable controls – meaning the operations could be controlled by the child or the therapist. Also, the controls needed to be mountable anywhere on the device.

“You never know exactly what a child is going to have that they can actively use with purpose,” Bullinger said. “If a child needs to use their thigh to power the device, we need to mount the switches in that area. If it’s their head that they can use, then we need a different arrangement.”

These mobility platforms also needed to be lightweight enough to be lifted by two adults in and out of a vehicle for transportation, as well as sturdy enough to handle more than a carpeted surface. Bullinger and her team are anticipating children to be able to use them on accessible playgrounds with varied terrain near the end of their training.

Last but not least, the devices needed to comply with the Americans with Disabilities Act, meaning the motorized platforms needed to be able to fit through doors, hallways and drive up certain angles of incline.

Eades worked with Unruh on the assembly side of things; Unruh also researched the use of batteries with the device and was principally responsible for writing the final report and project manual to be shared with the Anne Carlsen Center. Merila, a sophomore, came into the project at the start of the spring semester to provide support on the control side. He designed the parent control system, in the form of a remote control, and coded the mini-computer that enables the onboard controls for the device’s joystick and button systems.

Fortunately, according to Steinhauer, most projects are fabricated before Spring Break to allow for fine-tuning and more of a focus on writing and presenting before the end of the semester. Even so, some teams have had to make alternative arrangements for their projects’ completion. Due to the coronavirus removing students from campus, Eades completed the assembly’s finishing touches from her apartment and recruited her mom to help transport and test its capabilities.

“Our team was lucky to have our project able to be completed amid this pandemic,” Eades said. “This was our whole year of work, in this design, and to see it all come together was pretty special.”

REASONS TO BE PROUD

Now that the semester is finished, and the devices have been handed off to the Anne Carlsen Center, Eades has assured Bullinger and her team that she will be able to help show how the powered platforms are used, how they can be adjusted and what to do should problems arise.

The now-graduate has made plans to stay at UND and pursue a master’s degree, which will let her keep working with the Center, should they need assistance.

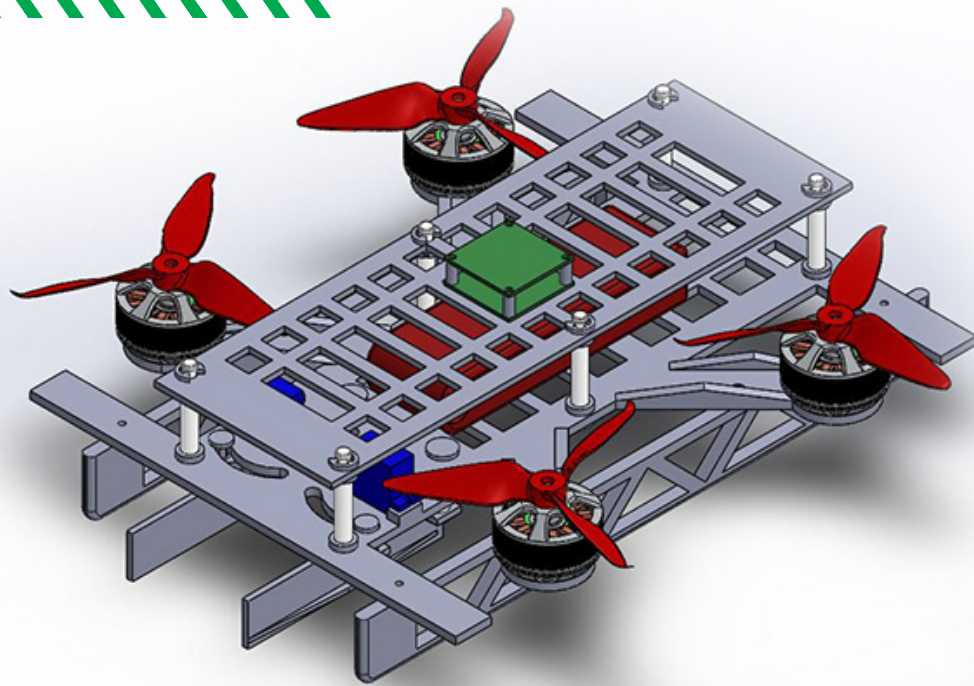
Gunderson commented that she’s looking forward to seeing the results in action, as soon as they’re able to start interacting in person once again.

“Like Alicia said, this device’s applications affect so many areas of development and open a whole new world for these kids,” Gunderson said. “We’re just very excited to get started with them and provide support to families and their children.”

Bullinger already has an idea of how they will be implemented into a 12-week training period comprised of 60-minute sessions where kids learn how to explore using their newfound mobility. Overall, she is entirely pleased with the work done by Eades, Unruh and Merila.

“I hope that they are proud of their work, because we’re really happy,” she said. “I hope they’re proud of what they’ve done for the lives that they’re affecting.”

Written by Connor Murphey | UND Today



Online students in Mechanical Engineering 201 at UND normally come to campus for a week-long, hands-on summer lab to build and test a robot prototype that they've spent the semester designing. This year, the project is to build a quad copter – shown in a computer-aided design or CAD representation – using components made on a 3D printer. Students will submit files to be 3D printed at UND. Those files then will be mailed to each group member for assembly (along with some electronics to test out that part of the design), then forwarded to the next team member to add his or her components to the unmanned aerial vehicle. The final student will conduct the test flight.

LONG EXPERIENCE WITH DISTANCE LEARNING HELPS COLLEGE OF ENGINEERING & MINES SUCCEED

When COVID-19 pushed classes fully online, UND's 31 years of training engineers remotely helped ensure a smooth transition.

Brian Tande paused. The dean of UND's College of Engineering & Mines, he'd been asked: was there anyone else — an online program administrator, for example — whom a reporter who's interested in UND's distance engineering program should talk to?

Then Tande laughed. "In the college? No, and I think that brings up a good point," he said.

"And that is, we don't have an online or a distance education coordinator — because it's everybody. You know, it's just part of what we do here, so that even before the pandemic, roughly half of our students were online.

"For years, it has been a huge part of what we do."

Around the country, the coronavirus caught colleges and universities by surprise, forcing them to move virtually all classroom instruction online. That's been a very real challenge: just last week, the Associated Press reported that students at several U.S. universities "are filing lawsuits against their schools demanding partial refunds on tuition and

campus fees, saying they're not getting the caliber of education they were promised."

For many engineering schools, the hurdles have been even higher, given that engineering programs typically call for students to get hands-on experience in workshops and labs.

But the College of Engineering & Mines at UND entered this era from a position of strength. That's because the College has been teaching engineering remotely for more than 30 years, and for more than 20 of those years, has offered a suite of fully accredited programs that are delivered via distance to undergraduate and graduate students.

Chemical engineering. Civil engineering. Biomedical engineering. Geological engineering. Petroleum engineering. To name a few.

"I started at UND in 2006, and I was teaching online courses right away," Tande said.

"A lot of people right now, around the country and around the world, they've been forced to learn how to teach online suddenly — in the middle of the semester. But in our case, most of our faculty have had distance education as just an inherent part of what they do.

"So we don't even have a clear separation between 'This is an online course' and 'this is an on-campus course,'" Tande continued. "They're pretty much blended across the board."

CHALLENGES MET

Understand, "blended" hasn't meant "all online, all the time" until recently. That means the College's faculty still had to transition from having some online students to having all of their students be online.

But the College's long experience with distance education made that change much easier, Tande said.

"There have certainly been challenges, especially when it comes to transitioning our lab courses and design courses to remote instruction," he said.

"But I really feel that we have been much better prepared than most. And as I mentioned, our faculty have had a lot of experience teaching remotely, and that has served them well."

The College's history with distance education stretches back to the 1980s, when a 3M manager proposed a UND engineering course for the company's employees nationwide. The College said yes; and last year, on the occasion of the 30th anniversary of UND's distance engineering program, UND Today chronicled the result.

A terrific anecdote from that article paints a picture of the program's origins:

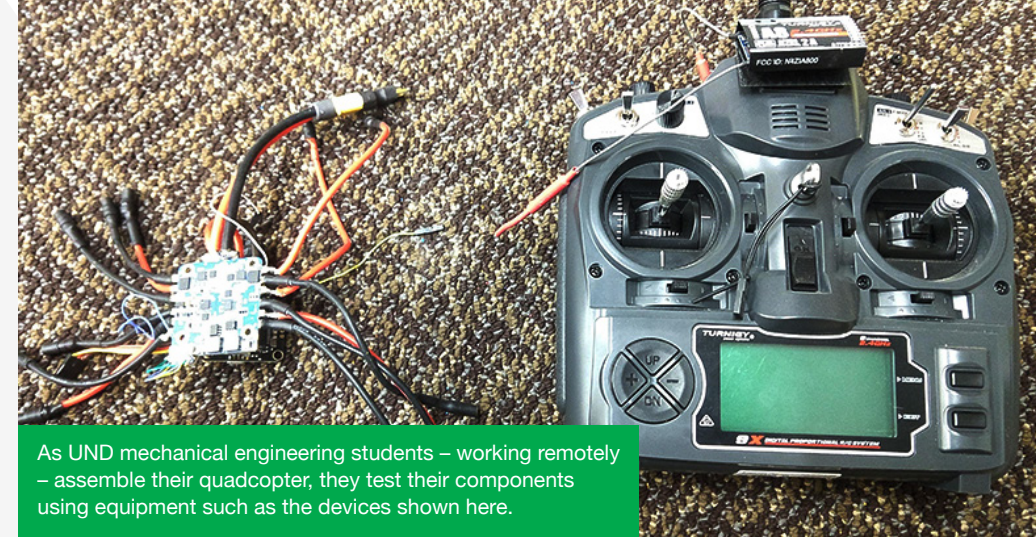
"In the late 1980s, Arnie Johnson had a new nickname: Fuzzy Arnie. ...

"(UND Professor) Johnson, who would also chair the Department of Electrical Engineering, taught the first ever distance-education class in engineering at UND, and ostensibly across the country.

"Lectures, led in empty auditoriums that resembled TV studios more than college classrooms, rolled on videotape to be snail-mailed to students. Technology, at the time, was very much still in its grainy inception, capturing blurry imagery. Hence, to the engineering learners beyond the Grand Forks campus, Johnson became Fuzzy Arnie.

"When the students came for lab the first year, they got to see what Arnie really looked like," said Johnson, who has since retired."

Over the decades, videocassettes gave way to DVDs. They in turn yielded to online classes as the Internet's capabilities grew.



As UND mechanical engineering students – working remotely – assemble their quadcopter, they test their components using equipment such as the devices shown here.

Today, UND engineering classes typically are heard by students in the classroom, students attending online, and students who download and listen to the class later on.

Several degrees can be earned entirely online. Others — such as chemical, civil and mechanical engineering — ask remote-learning students to come to campus for intensive, one- to two-week-long lab experiences in the summer.

"We love it when those distance students come to campus," Tande said. "You have a student whom you've had in three or four classes, but have never seen face-to-face. You get to know them and see the common experiences that students from all over the country have here.

"Then a few days later, you see them wearing UND gear, and you know they're really proud to be a part of the campus experience."

MORE INNOVATION TO COME

This spring, of course, the buildings have been quiet as all instruction has moved online. But the laboratory and hands-on work continue. That vital work gets accomplished through such means as computer-simulated labs, virtual-reality labs, and assembly kits that students can work on at home, Tande said.

"For example, we're now recording certain experiments," he said. "We'll have someone in the lab do the experiment. We'll have a narrator describe each step.

"Then we'll provide the student with some data sets so they can do the analysis and so on. That's the kind of approach we're relying on this summer."

Students at the College appreciate the effort.

"Things are really going well this semester, even though the transition that has taken place over the past few months," said Noe' Lopez, a UND senior who's pursuing a B.S. in mechanical engineering.

"I'm proud to say that UND has done such a top-tier job ensuring that the transition to online classes has been a smooth one. ... UND is a gem, and I'm so glad I followed the advice of my mentors early on who suggested I receive my education from the University of North Dakota."

Steven Tkach agreed. "The distance learning is absolutely great," said Tkach, whose UND degree will be in civil engineering.

"(T)he quality of education I am receiving online is the same as if I was sitting in a classroom. I would debate that online delivery in effectively teaching a subject is actually better than being in a classroom. I have the ability to pause, rewind, or fast forward a lecture to make sure I understand the subject matter."

The lesson of the above is clear, Tande said. And if Tande were to address an audience of his fellow engineering deans, most of whom would be wondering how to succeed at distance learning, he'd sum that lesson up in four words: It can be done.

"We've definitely proven that," he said. "Of course, the pressure is now on, because a lot of schools are learning that they can teach online, so we're probably going to see more competition. But that just means we'll need to be even more innovative — and we've proven we can do that, too."

Written by Tom Dennis | UND Today

HAROLD HAMM AWARDED HONORARY DEGREE FROM UND

Honorary doctoral-degree recipient Harold Hamm visits campus and shares advice with UND’s engineering students



On February 28, Hamm received an honorary degree from UND in recognition of his standout career and his support for the University and its students. Just hours after he received an honorary doctorate Harold Hamm sat down to visit with engineering students at a “fireside chat.”

College of Engineering & Mines Dean Brian Tande introduced Dr. Hamm, executive chairman and founder of Continental Resources, which was one of the first oil companies to initiate horizontal drilling in the Bakken. The Harold Hamm School of Geology and Geological Engineering is named after Hamm, who has also endowed two professorships — one each in petroleum geology and petroleum engineering — at UND.

Tande thanked Hamm for his generosity, then turned the program over to Hamm and the students.

“It’s good to be here,” said Hamm, who grew up in rural Oklahoma, worked in oil fields, and established Continental Resources in 1967 at the age of 21. “Anytime I come on campus, my favorite part is talking to students. I hope I inspire you a little bit. You inspire me a great deal. Being on campus is a treat for me. It reminds me of my schooling and training and spending 40 hours a week in an ‘ology’ lab.”

Hamm answered a variety of questions from students, most of whom thanked Hamm for his support of the School and its students.

ON OIL FIELD EXPERIENCE

Hamm emphasized that students need field experience.

“Learn as you go,” he said. “Field experience is really important. Later, when you’re in the office doing math, you’ll know what you’re doing. We have 300 people in the field, and are always needing more folks.”

WHAT UND CAN DO

UND turns out some really good people, Hamm said, adding that basic training is important.

“A degree in engineering means a lot, and field training makes you valuable. Get the basics down. We have some good geologists from UND working in Oklahoma.

ON “SOFT SKILLS” FOR ENGINEERS

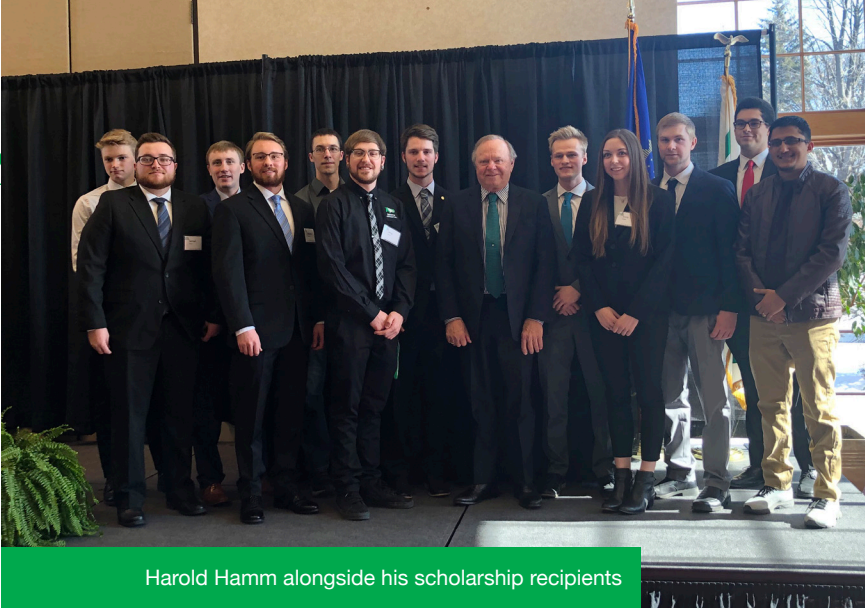
“Too many people hire for skill, not quality and character,” Hamm said. “We’re looking for people who are ethical and work hard. Quality of character means more to Continental than anything else. We run lean, and don’t hire more people than we need. We want them to learn the business and have loyalty. Do you love the industry? If not, you’re not the right person for us.” He added that his company tries to protect employees and avoid layoffs during down cycles.

ON DOWNTIME

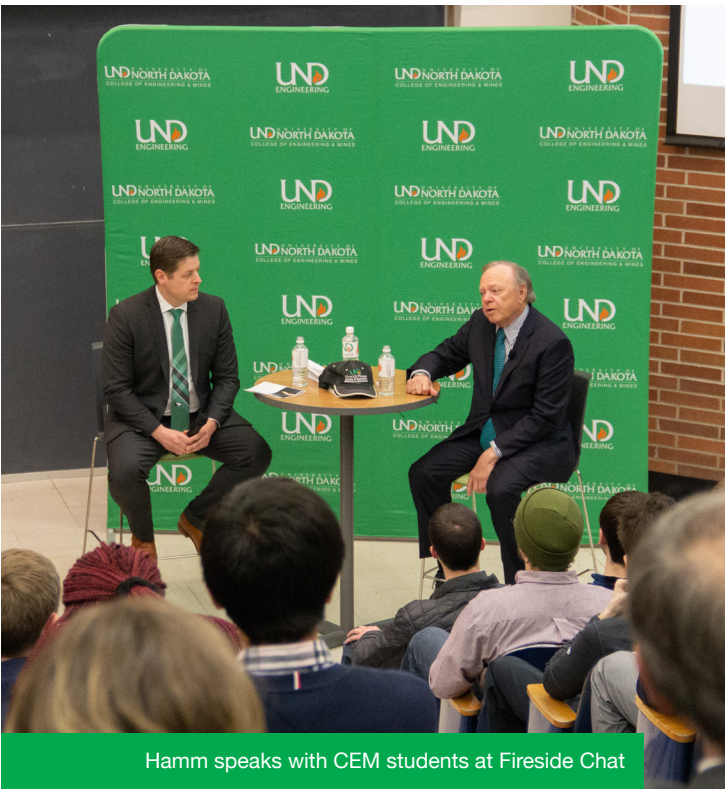
When asked what he does for fun, Hamm said he likes to hunt and fish. He added that he enjoyed visiting with the students.

“It’s good to be here with you,” he said. “We’ve talked fun and serious stuff. It’s wonderful to be in the position we are.”

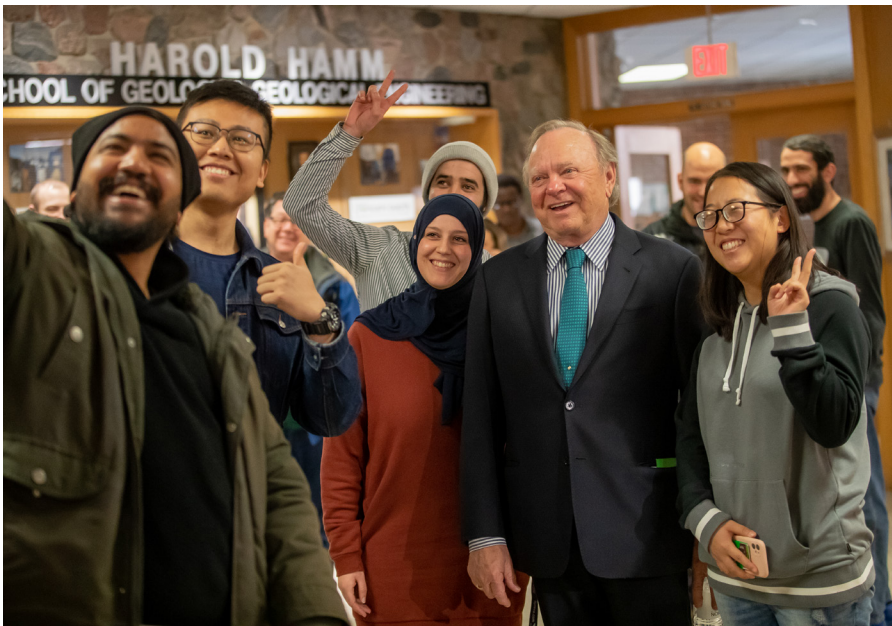
Excerpt: Hamm shares hard-won knowledge with UND students
Written by Jan Orvik | UND Today



Harold Hamm alongside his scholarship recipients



Hamm speaks with CEM students at Fireside Chat

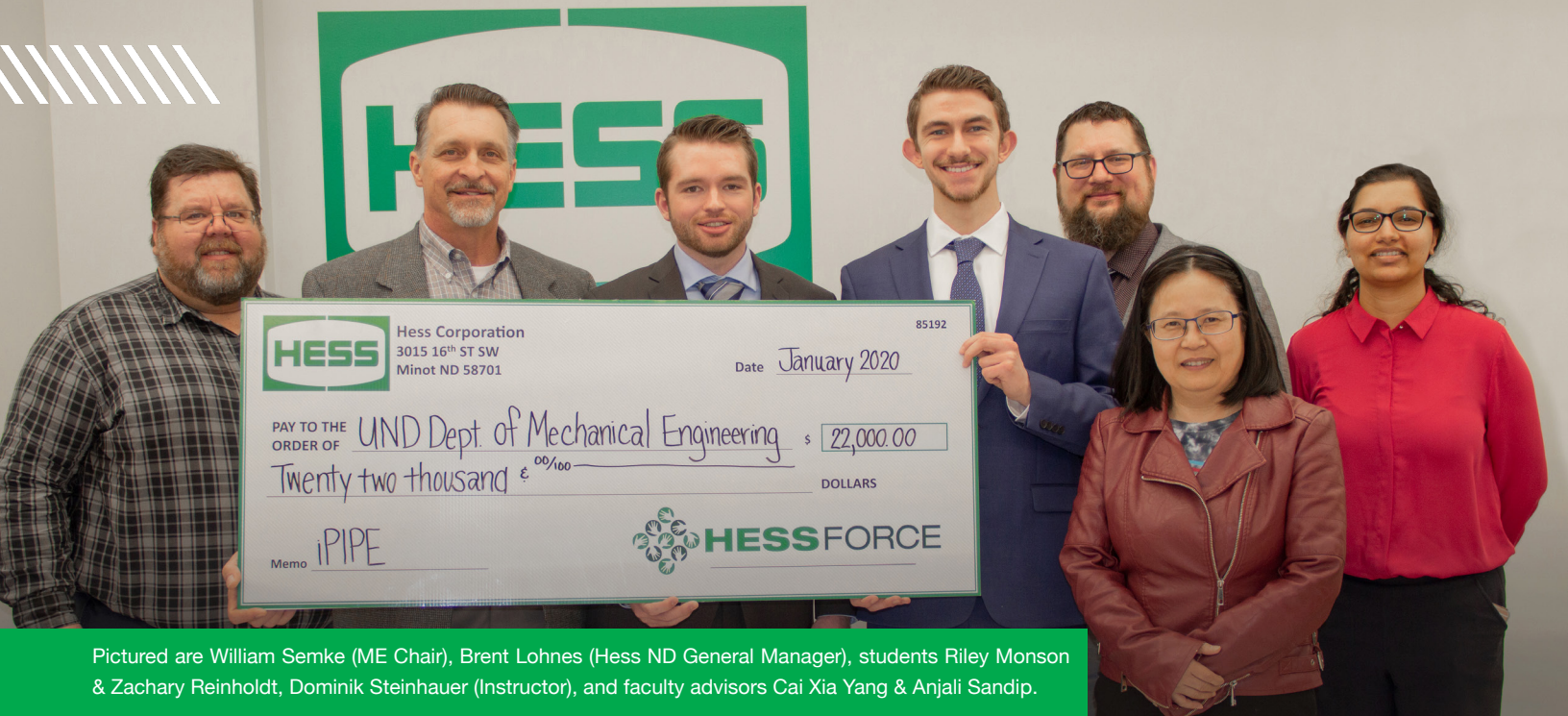


Hamm with North Dakota Senator John Hoeven at Fighting Hawks Men’s Hockey game



FACULTY HONORED AT CEREMONY

At the ceremony, Stephan Nordeng, Associate Professor of Geology & Geological Engineering and Vamegh Rasouli, Petroleum Engineering Department Chair, were honored alongside Harold Hamm. Stephan Nordeng is recognized as the *Harold Hamm Professor of Petroleum Geology* and Vamegh Rasouli is recognized as the *Continental Resources Distinguished Professor*.



Pictured are William Semke (ME Chair), Brent Lohnes (Hess ND General Manager), students Riley Monson & Zachary Reinholdt, Dominik Steinhauer (Instructor), and faculty advisors Cai Xia Yang & Anjali Sandip.

MECHANICAL ENGINEERING STUDENTS POWER PROJECT TO DETECT PIPELINE LEAKS

Imagine a bright orange sensor, about the size of a golf ball, that can travel through pipelines and detect potential leaks and other problems.

Those “smart” golf ball sensors, called Pipers® and made by Ingu Solutions, are now a reality. They can be placed inside a pipeline and flow with the product stream.

Pipers®, now being used in the oil fields, are just one solution to North Dakota Gov. Doug Burgum’s 2017 challenge to the oil industry to find new ways to prevent pipeline leaks and protect the environment.

The UND Energy & Environmental Research Center (EERC), is leading an industry consortium, called intelligent Pipeline Integrity Program (iPIPE), which is also working to develop new technologies to detect and prevent pipeline leaks.

The challenge is launching and receiving the Pipers® without stopping product flow and executing the design without any cutting or welding in the field or during fabrication.

That’s where UND mechanical engineering students come in.

Four seniors were tasked to design a prototype launcher to deploy and retrieve Pipers®. The project is sponsored and supported by Hess Corp., which gave students a budget to order materials.

“Hess has a strong partnership with UND,” said Reuben Gates, a Hess Corp. employee who is overseeing the project and is also a UND alum with bachelor’s and master’s degrees in mechanical engineering. “We’ve worked with them on the iPipe Consortium and with the UND Energy & Environmental Research Center. It made sense to keep it within UND’s sphere.”

It’s a big project, with big benefits for North Dakota and the oil industry.

“This is an important project,” said Gates. “It will minimize leaks, and it will make North Dakota a better place by minimizing leaks and protecting the environment. The challenge is the infrastructure.”

UP TO THE CHALLENGE

Challenge, indeed.

The problem is that Pipers® are so small – between 1.5 and 2.2 inches – that they’re hard to “catch” inside the pipeline.

The students designed a solution – much of which is proprietary – which was recently approved by Gates. Now they are working to build it.

“The design is there,” said Dominik Steinhauer, senior lecturer in mechanical engineering and instructor for the project. “I’m thoroughly impressed with this team.”

“If you can’t catch the Pipers®, you can’t read the data,” said Zach Reinholdt, a mechanical engineering senior from Williston, who designed a solar-operated sensor that will send a signal when it’s caught. “I really enjoyed figuring out a solution to the problem.”

TEAMWORK AND TECHNOLOGY

The key has been teamwork.

“This is a unique challenge from Hess and a good opportunity,” said Noe’ Lopez III, a distance mechanical engineering senior from Houston. “Everybody contributes. This team gelled very well, and there is no other feeling in the world than when you have a strong team.”

Lopez added that technology have helped him and fellow distance mechanical engineering senior Karen Redig, from Glenrock Wyo., feel as though they’re right on campus.

“It is a good experience,” said Redig, who works full-time at a privately owned oil company. “The team meets a lot, and one hour meetings turn into two hours. I enjoy working with everyone and getting to know them.”

Now that the design is approved, Riley Monson, a mechanical engineering senior from Bottineau, N.D., is looking forward to building the launcher and receiver prototype, which will be transported on a test stand he designed along with a pump and water tank.

“This has been a huge learning experience,” Monson said. “We keep in touch with texts, Zoom meetings, and share ideas. I’ve enjoyed learning more about oil and gas.”



SOLVING REAL-WORLD PROBLEMS

“The students have not only gotten the opportunity to work through the design cycle of a product, but also to collaborate with working professionals on a project that can impact public safety and the environment,” said Anjali Sandip, senior mechanical engineering lecturer and a faculty advisor for the project. “The skills acquired by the students would place them in a highly competitive position in the job market.”

“This senior design project provides students with a very challenging real-world problem,” said Cai Xia Yang, assistant professor of mechanical engineering and a faculty advisor. “They learned totally new technologies from Reuben Gates at Hess and Brad Stevens at EERC, and they came up with new ideas. I can’t wait to see the prototype.”

“Projects like this help students get a taste of the real world,” said Steinhauer. “It’s good, practical, hands-on experience that lets them apply all they’ve learned. Reuben and Hess have been amazing to work with.”

“Although Karen and I are working at a distance, we feel right there,” said Lopez. “Hess has given me an opportunity to better ourselves as project professionals. My favorite part of this project has been the team collaboration and innovating a new concept to help keep North Dakota’s environment clean.”

Even though all students are now meeting remotely because of the COVID-19 pandemic, the work continues.

“It’s been fantastic working with the students,” said Gates. “We’re working on something that can make North Dakota even better.”

Written by Jan Orvik | UND Today

SPONSOR ADVISOR

Reuben Gates | Engineer Advisor
Hess Corporation

ACTIVE STAKEHOLDER

Brad Stevens | Research Engineer
EERC

CLASS INSTRUCTOR

Dominik Steinhauer | Sr. Lecturer
Mechanical Engineering

FACULTY ADVISORS

Dr. Anjali Sandip | Senior Lecturer
Mechanical Engineering

Dr. Cai Xia Yang | Assistant Prof.
Mechanical Engineering

STUDENT TEAM

Riley Monson | Project Mgr.
Mechanical Engineering

Zachary Reinholdt
Mechanical Engineering

Noe’ Lopez III
Mechanical Engineering
Distance Education

Karen Redig
Mechanical Engineering
Distance Education

AROUND CEM



ENGINEERS WITHOUT BORDERS IN GUATEMALA

“It will also be your responsibility to pass on the skills you have acquired to those coming along after you. You will have mentors in the workplace, and with time you will give back by mentoring others. I have found it very rewarding to give back to others through mentoring. Promote STEM programs where possible, encourage the next generations of engineers and promote UND where possible.”

LISA BARNES
ADDRESS TO THE CLASS OF SPRING 2020

CEM EXECUTIVE BOARD MEMBER, UND ALUMNI ASSOCIATION FOUNDATION BOARD MEMBER, CEM EE ALUMNAE, RETIRED EXECUTIVE, HONEYWELL



ORDER OF THE ENGINEER & PLEDGE OF THE COMPUTING PROFESSIONAL CEREMONY
This spring, CEM hosted the annual ceremony virtually through Zoom and Facebook Live. With 78 students participating remotely, the ceremony reached over 700 viewers.



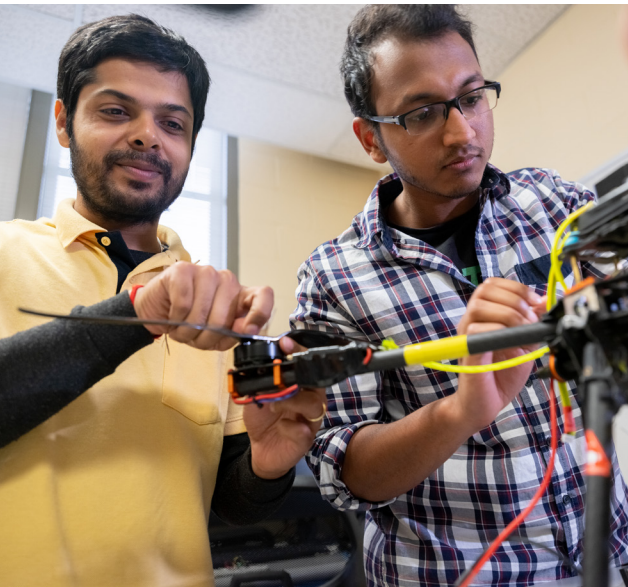
2019 ANNUAL NATIONAL SWE CONFERENCE IN ANAHEIM, CA



CEM STUDENT AMBASSADORS
SUPPORTED BY THE EDSON & MARGARET LARSON FOUNDATION
Sam Larsen, Makayla Mather, Brinna Murray, Bridget Heiland, Walker Cage assist with prospective student tours, give K-12 STEM demo's at regional schools, and assist with other outreach events.



MARCH 2020 BIG IDEAS CHALLENGE WINNING TEAM
SUPPORTED BY THE EDSON & MARGARET LARSON FOUNDATION
The competition challenges students to propose solutions to national and global problems. Pictured are: (left to right) Nick Knapp, Xueling Song, Luis Ascencio Lopez, and Foued Badrouchi.



FIRST LEGO LEAGUE STATE CHAMPIONSHIP 2020



2019 WINTER COMMENCEMENT CEREMONY



ON THE ROAD



COLLINS AEROSPACE, CEDAR RAPIDS, IA
Ryan Adams & Will Semke view flight simulators.



BOEING PRODUCTION FACILITY, EVERETT, WA.
Representatives from UND CEM, JDOSAS and UND AAF tour facility.



COLLINS AEROSPACE, CEDAR RAPIDS, IA
Thank you to our hosts: Paul Heyd EE'95, Corrie Block EE'00, James Jemtrud EE'08, Kevin Kovar EE'97, and Nikki Heyd Geography '95 (not pictured).



PHOENIX, AZ CEM ALUMNI SOCIAL
Pictured are Lisa Barnes EE'88, Jody Lindbo ME'09, Al Larson Geology '88.



MUSEUM OF FLIGHT, SEATTLE ALUMNI SOCIAL 2019
(Left to right) Carol Orr, Curtis Orr EE'53, Andrea Dickason ME'11, Brian Tande, Deb Austreng, Ryan Adams, Rick Dahlen ME'77.



AGC SCHOLARSHIP AWARDS

The Associated General Contractors of North Dakota team, Russell Hanson, Dan Swingen and Paul Dietrich, were on campus to present 2019 scholarships to Tyler Vonasek (Walt Swingen Scholarship), Raphael Schill (John Jardine Scholarship), and Aaron Kemnitz (Don Lindberg Scholarship). Congratulations to the recipients and thank you to AGC! The AGC awarded the first John Jardine Scholarship in 1964 and the Walt Swingen scholarship in 1988. Both are full-tuition scholarships.



IN MEMORY OF LARRY JODSAAS

It is with our deepest sympathy that we announce the passing of Larry Jodsaas, BSEE'62, 2003 Alumni Hall of Fame Inductee and generous benefactor and friend to the College of Engineering & Mines. Larry lost his battle with Alzheimer's on April 27, 2020 in the peacefulness of his Summit Hill home in Saint Paul, Minnesota. He was born May 11, 1935 in Lisbon, ND. He completed his Bachelor of Science degree in Electrical Engineering from the University of North Dakota in 1962. That same year, Larry began his career at Control Data with an engineering position. During his 25 years there, he discovered he liked managing electrical engineers better than being one himself and became the Senior Vice President of Quality and Operations Effectiveness. In 1988 Larry became President and CEO of VTC, Inc., a subsidiary company of Control Data, and two years later, he purchased VTC from Control Data for \$1 plus it's added financial encumbrance.

In 2008 Larry received the UND Alumni Association Sioux Award. Through his very generous gift to the UND College of Engineering & Mines opened the Jodsaas Center for Engineering Leadership and Entrepreneurship that same fall. The interior design and décor of the Center reflects Larry's passion for boating. A 2012 Yachts International article describes in detail Larry's 102 ft. custom momentous exhibitioner, and quotes Larry, "I want to be able to go anywhere in the world, and to stay any length of time, in any port."

2020 FOUNDERS DAY AWARDS



THE UND FOUNDATION/B.C. GAMBLE FACULTY AWARD FOR
EXCELLENCE IN TEACHING, RESEARCH OR CREATIVE ACTIVITY & SERVICE
Awarded to Michael Mann, Chester Fritz Distinguished Professor & Executive Director, IES



UND FOUNDATION/McDERMOTT FACULTY AWARD FOR
EXCELLENCE IN UNDERGRADUATE TEACHING
Awarded to Dexter Perkins, Professor, Geology & Geological Engineering

HONORED RETIREES

- George Bibel | Professor, Mechanical Engineering
- Philip Gerla | Associate Professor, Geology & Geological Engineering
- Janet Honek | Student Academic Advisor, College of Engineering & Mines
- Sukhvarsh Jerath | Professor, Civil Engineering



DEPARTMENTAL EXCELLENCE IN RESEARCH AWARD
Awarded to the Department of Chemical Engineering

25-YEAR HONOREES



DR. JOEL NESS
Assistant Professor | SSSC



DR. HOSSEIN SALEHFAR
Professor | SEECs



BRENDAN BLADES

CIVIL ENGINEERING

In 2013, he began to feel restless, trapped in an industry for which he found little enthusiasm. He shifted gears, earned a computer-aided design degree from a local technical college and started a job at a construction company that devises solutions for concrete walls.

“Once I got there, I realized I really do want to become an engineer,” Blades said. The creative challenges of executing others’ designs perked him up, but he craved the thrill of chasing his own building ideas. “I can walk around Seattle and see a building I worked on, see the details I worked on,” he said. “How much cooler would it be if it was something that I actually decided rather than something I took off from someone else’s work?”

But there were no local universities where Blades could study and work at the same time. UND’s accredited distance engineering program, which recently marked its 30th year, offered what Blades sought – quality, flexibility and engagement.

Pursuing civil engineering online, however, is no small feat. After he leaves his cubicle at 3 in the afternoon, Blades spends hours doing homework. Amid work obligations and family duties, he grinds through classes such as calculus, differential equations and fluid mechanics. These are subjects that once intimidated him. But his efforts are paying off, backed with the support he needs professionally and academically.

“You are not going to find [these classes] online anywhere else, you are not going to find them accredited anywhere else,” Blades said. “UND made such an effort to put infrastructure in place. There is a resource for everything. There is someone you can ask. I find people that are so helpful.” Balancing a couple of classes into his routine each semester, Blades plans to graduate in about two or three years.

“Finishing this degree should be a life-transforming event,” he said. It would also be a step toward what he hopes to be his own engineering wonder: a skyscraper in downtown Seattle.

The pyramids in Egypt. Stonehenge in Britain. Roman bridges. The Great Wall of China. These everlasting architectural and engineering wonders fascinate Brendan Blades. It’s a fitting allure for him, one that marries his long love of history with his more recent interest in engineering.

Blades holds a bachelor’s degree in history, which was supposed to lead to a career in education. Today, however, it kindles his passion for civil engineering, which he is studying online at the University of North Dakota. “I enjoy reading about how different cultures practiced engineering in the past, practiced architecture,” said Blades. “Civil engineering is a chance to meld that passion with something more practical.”

It is also a chance for Blades to follow a calling that took years to crystallize. Blades’ undergraduate education took him from his native Seattle to Arizona and later to northern Mongolia with the Peace Corps. In a village with no running water and intermittent electricity, where temperatures dropped to 40 below zero Fahrenheit in winter, he taught English for two years. It was a time of little physical comfort but tremendous intellectual and emotional reward. It was a time of simple living and communal bonding.

“There is a saying that Peace Corps volunteers have,” Blades said. “They say that you get a lot more from the culture you serve than you can ever give them.” Teaching, though, proved to be a poor fit for him. So, upon returning to the West Coast, Blades leaped into the restaurant business for five years.

COLIN SABIE

MECHANICAL ENGINEERING

When Colin Sabie – fresh out of high school – first arrived at the University of North Dakota a decade ago, he felt unready for college. “I didn’t declare a major, I didn’t put the work that I should have put into classes, and I didn’t do well,” said the Minneapolis native. “I knew that I was capable of getting decent grades, and I wasn’t doing that.”

Sabie spent three semesters on campus “spinning his wheels,” he said, before leaving the classroom for the U.S. Army. He thought the military would provide the structure and direction he was seeking. And he was right.

For the next six years, Sabie served as an Unmanned Aerial Vehicle (UAV) mechanic, stationed in New York and deployed twice, once to Afghanistan and the other time to Iraq. “I spent a lot of time doing maintenance,” Sabie said. “On the specific type of UAVs I worked on, there were a lot of very small spaces that I had to get my hands into in order to test a component or replace a component or fix something. And a lot of the setup seemed very counterintuitive to me.”

So, instead of pursuing a career in the military, Sabie decided to go deeper into his craft. He sought to understand the reasons behind the design oddities that had caused him so much frustration in the field.

Coming back to UND was an easy choice. He knew the University had quality programs at affordable tuition rates. Mechanical engineering was the degree Sabie wanted to pursue.

As a veteran with GI Bill benefits, Sabie found enrolling back in classes to be effortless, thanks to the support of the Admissions Office and the Office of Veteran & Military Services.

“When I was getting out of the Army and just trying to figure out what paperwork I needed, what the admission dates were, how to enroll, there were many, many phone calls I had with UND staff,” said Sabie. “They were available, and they were more than happy to get me the help I needed.”



Returning to UND was one thing. But adjusting to student life – despite Sabie’s determination to succeed at his second try in higher education – came with its challenges. Some classes were hard. Physics was one of them – mostly because it heavily relied on calculus. Seven years after taking calculus in high school, “I was back doing this very hard math again,” Sabie said. “A lot of my skills ... I mean, they were rusty, to put it lightly. The course moved very fast and I had to do a lot of catching up.” But he succeeded. He asked professors for help. He got some math tutoring. And in the end, he earned a pretty good grade.

Today, Sabie is a junior, tackling courses with intimidating titles such as finite element analysis, differential equations, materials science and intermediate thermodynamics. He is also a math tutor.

“When I first got here, it was a struggle,” Sabie said. “I got a lot of help from people. And when I was given the chance to tutor, that was my chance to do the same for someone else. I know it can be hard for some people who, like me, might not have a traditional way of understanding things because I’ve taken a seven-year break from school.”

Although it took him that long to find his calling in mechanical engineering, a span that included leaving college and serving hi as country, Sabie does not regret the journey. “If I had to do it all over again, including picking a school and a major, I would do exactly the same thing,” he said. Next on his mind is a master’s degree from UND.



HONOR DR. TOM OWENS AND DOUBLE THE IMPACT

A donor has provided a dollar for dollar match of up to \$250,000 through Dec 31, 2020, that will elevate the Thomas C. Owens Endowed Chair of Chemical Engineering to the next level.

ADVANCE TOM'S GOOD WORK

Take this opportunity to honor Dr. Tom Owens, longtime faculty and leader in UND's College of Engineering & Mines, and ensure a position for high caliber faculty. Many have reaped the benefits of Tom's passion for education. **Today, we are calling on those who have been touched by Tom's unprecedented service to take up this match challenge.** Time is of the essence. Will you help us secure the funds and advance the good work Tom started? Your gift today will make a difference for tomorrow's engineers.

DR. THOMAS C. OWENS

Dr. Tom Owens taught at the University of North Dakota College of Engineering & Mines for 33 years; serving as a department chair in Chemical Engineering for 23 years from 1974 to 2000. He also served as the interim dean of the College intermittently from 1989 to 2001. In addition to being an outstanding teacher, Tom developed strong relationships with students and went out of his way to help them achieve success. Tom retired in 2001, but his enthusiasm for excellence continues on through the Thomas C. Owens Endowed Chair of Chemical Engineering.

THE ENDOWED CHAIR IMPACT

As leading scholars in their fields, endowed chairs are influential thought leaders whose expertise and leadership draw top-notch faculty and students. Their influence has a lasting effect on learning inside and outside the classroom. Endowed chairs secure research grants and private support, bring in national conferences, and foster media attention and partnerships. This is one of the few endowed chair positions at the University of North Dakota.



An endowed chair position was named after Dr. Thomas C. Owens in 2004.



Dr. Owens served as professor, department chair and interim dean of the UND College of Engineering & Mines.

TO MAKE A GIFT OR GET MORE INFO:

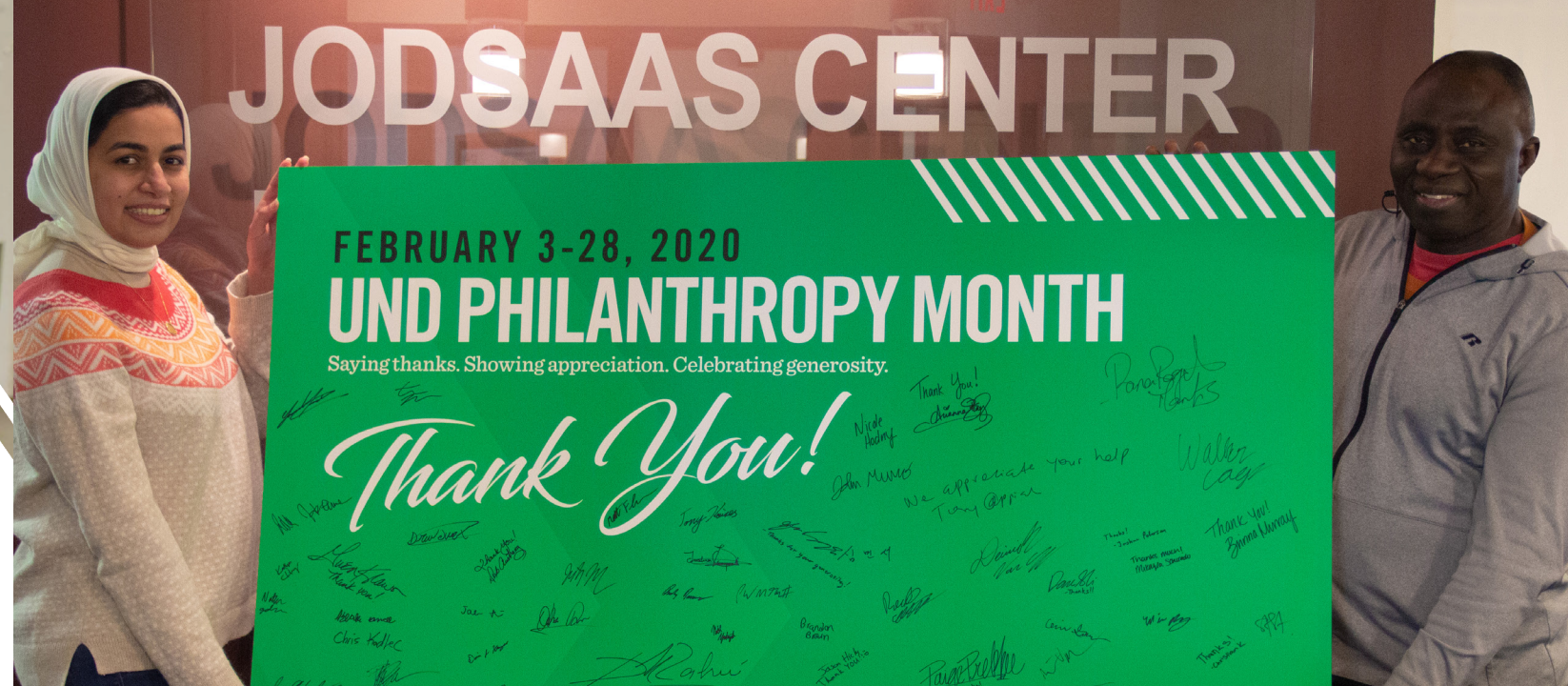
Robin Turner, '89

Director of Development,
College of Engineering & Mines
701.777.1428
robint@UNDfoundation.org



Use this QR code or visit
UNDalumni.org/owens

UND ALUMNI ASSOCIATION
FOUNDATION
LEADERS IN ACTION.



A MESSAGE TO OUR ALUMNI & FRIENDS

The past few months have been nothing short of immense change in our everyday lives. We find ourselves in a completely different world than the last time the UND College of Engineering & Mines magazine landed in your mailbox. The coronavirus pandemic has impacted all of us in ways we never could have imagined. While we are unable to be near many of you, there are two facts that continue to unite us: we love the university and we are inspired by you, our alumni and friends.

In light of the pandemic, support for our students is critical now more than ever. The CEM Annual Excellence Fund is an important resource for the college in supporting our outstanding students. I encourage you to consider a gift to the Annual Excellence Fund. Together, we can all make a difference in the lives of our outstanding students.

CEM ANNUAL EXCELLENCE FUND

The Annual Excellence Fund makes a tremendous difference for everything we do for our students. Our students' experience is dependent upon your generosity and support of our students, faculty and programming.

ANY GIFT

Gifts of any size to the Annual Excellence Fund add up to create new opportunities for current and future students!

EVERY YEAR

Make your sustained impact on the college by giving annually!

MAKES A DIFFERENCE

Every student is impacted by your support!

When we seek the support of our alumni and friends the lives of our students are forever changed.

You can make a gift at UNDalumni.org/CEM

We are looking forward to returning to our campus, to the halls and classrooms full of students, faculty and visitors. Our alumni add so much to the student experience. When you decide the time is right to return to UND, tour the CEM campus, meet with administration, faculty and students, let us make that experience happen for you. Until then, please enjoy this recap of some of the excitement that happened this past year.



Deb Austreng | Director of Alumni,
Corporate & Public Relations
701.777.4249
debra.austreng@UND.edu



Robin Turner | Director of Development
701.777.1428
robint@UNDfoundation.org
[LinkedIn.com/RobinTurner](https://www.linkedin.com/RobinTurner)

Upton II Room 165
243 Centennial Drive, Stop 8155
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Grand Forks, ND 58202-8155

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WE ARE LEADERS IN ONLINE EDUCATION

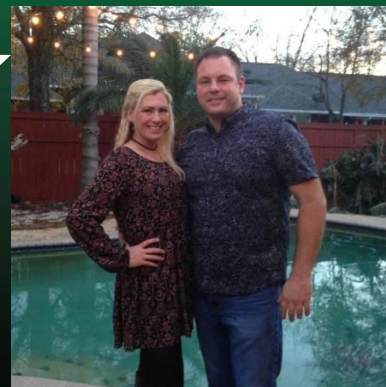


"Things are really going well this semester even through the transition that has taken place over the past few months. I'm proud to say that UND has done such a top tier job ensuring that the transition to online classes has been a smooth one. Additionally, the CEM faculty's assistance and guidance have proven to be resilient during these times. UND is a gem, and I'm so glad I followed the advice of my mentors early on who suggested I receive my education from the University of North Dakota. It has been a wonderful decision and I intend to give back to the University who made it all possible. I'm proud to be a part of the UND tradition and will continue to represent the University with professionalism and excellence."

NOÉ LOPEZ | B.S. MECHANICAL ENGINEERING

"I am thoroughly impressed with the professors that I have had at UND. The distance learning is absolutely great. Everybody that I have interacted with (advisors, professors, and others) in pursuant of my degree has been awesome. When I began my online degree with UND I quickly learned that the quality of education I am receiving online is the same as if I was sitting in a classroom. I would debate that online delivery in effectively teaching a subject is actually better than being in a classroom. I have the ability to pause, rewind, or fast forward a lecture to make sure I understand the subject matter."

STEVEN TKACH, P.E. | B.S. CIVIL ENGINEERING



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