

THOROUGH

Rebuilding from the ground up.
How the first-year program has been
completely redesigned for the future.



UNIVERSITY OF SASKATCHEWAN
College of Engineering
ENGINEERING.USASK.CA

Keeping the C.J. Mackenzie
tradition alive

- Keep Open Mind
- Learn to Love Learning
- Dream Big
- Embrace Change
- Don't Be Afraid to Make Mistakes
- Stay Curious
- Try Different Things
- Surround yourself With Great People
- Give Back Where Possible
- Find What Inspires You

C.J. Mackenzie
Gala
of Engineering
Excellence



USask Engineering is delighted that **Myron Stadnyk** (BE'85) will be the 45th C.J. Mackenzie Distinguished Lecturer. Stadnyk, selected by the Department of Mechanical Engineering, retired in 2020 as president and CEO of Calgary's ARC Resources. As vaccines have allowed easing of public health restrictions, we look forward to celebrating our lecturer and our engineering community in early 2022.

2020: Brad Polischuk (BE'88, MSc'90, PhD'93)

Polischuk, selected by the Department of Electrical and Computer Engineering, is vice president, detector technologies, at Hologic, a U.S.-based medical technology company where he has made a transformational impact on breast cancer detection.

2019: Joe Deutscher (BE'85)

Deutscher's successful career at Dow Chemical had him working in various posts around the globe before his 2019 retirement. The Department of Chemical and Biological Engineering selected him as the 2019 Distinguished Lecturer.

2018: Mike Marsh (BE'79)

Marsh has been president and CEO of SaskPower since 2015 and before that he was its chief operations officer. Marsh, who also holds an MBA from Queen's, was chosen by the Department of Mechanical Engineering as its Distinguished Lecturer.

Distinguished Lecturer Brad Polischuk speaking at the 2020 C.J. Mackenzie Gala, where he touched on 10 lessons from his career that have defined him.

Photo by Bob Holtsman

In memoriam

The College of Engineering remembers with respect and fondness these distinguished members of our USask Engineering community – college leadership, faculty and longtime alumni volunteers – who passed away in recent years.

Arthur Dumont, October 7, 2019:
C.J. Mackenzie Distinguished Lecturer; Trustee, Engineering Advancement Trust; USask Honourary Doctor of Science

Ronald Fleming, October 25, 2019:
Professor

Robert (Blair) Hockley, March 5, 2021:
Trustee, Engineering Advancement Trust

David Male, September 16, 2020: Professor

Peter Nikiforuk, July 19, 2018: Dean

John (Jack) Postlethwaite, April 21, 2020:
Department Head

Dennis Pufahl, September 13, 2019:
Department Head

Byron (BJ) Seaman, April 24, 2021:
C.J. Mackenzie Distinguished Lecturer; Trustee, Engineering Advancement Trust; USask Honourary Doctor of Laws

Colin Sargent, February 24, 2021:
Professor

THOROUGH

Editor
Donella Hoffman, Communications Officer, College of Engineering

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Roger Denis, Denis Design Works

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Contact
College of Engineering
57 Campus Drive
Saskatoon, SK S7N 5A9
Phone: 306-966-5273

General: coe.inquiries@usask.ca

Alumni: carlene.deutscher@usask.ca

Donors: richelle.kenn@usask.ca

Communications: donella.hoffman@usask.ca



engineering.usask.ca

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RE-ENGINEERED for student success 37



The College of Engineering is seeking to create the most effective first-year engineering program in Canada, starting in fall 2021.

USask Engineering answers the call 13



Engineering alum and his team designed and manufactured a rugged emergency-use ventilator.

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Yufeng Wang hadn't considered being an entrepreneur, until Saskatoon changed his mind.

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DEAN'S OFFICE

A few minutes with the dean

We have a great team and we need to keep our focus laser sharp as we move through this decade. Our strategic plan will deliver on our economic promise to this province and our students.

SUZANNE KRESTA

Photo by Matt Ramage

Dean Suzanne Kresta reflects on some key accomplishments within the college since her arrival in 2018 and looks ahead to what's next.

Of all the work that's been accomplished since you arrived in 2018, what are you most proud of?

I'm most proud of the renewal and sense of hope in the college. We've had incredible support from the community and the university as we've tackled some important tasks – rebuilding core functional roles in the college, building endowed chairs, and implementing our vision for the future. Our leadership teams have really delivered – and I am inspired every day by the way everyone is aligned and working together to achieve great things.

What is the biggest thing on the horizon this year?

We're preparing to launch our completely renewed first-year program this fall; we call it RE-ENGINEERED. Our Engineering Advancement Trust alumni and longtime supporters of the college, Ron and Jane Graham, have been unwavering in their support of the vision for this program. As a result, we have something very exciting to share – and based on our enrolment numbers, others are excited about it, too. You can read more about RE-ENGINEERED in this issue of Thorough on page 37. I am inspired by our first-year design team's rigour and creativity – and excited to welcome our first cohort of students to this new way of learning. It won't be less demanding or less transformative. It is focused and efficient like a great engineering design.

The COVID-19 pandemic has had an immense impact on our lives since March 2020. As you've led USask Engineering's response, what has been most meaningful to you as a leader?

This year has given me a renewed appreciation for the privilege and excitement of our campus learning community. Being surrounded by bright minds of all ages, never knowing what surprise will delight us in a conversation in The Bowl or on the way to our next class or meeting . . . these are some of our fondest images of campus.

The things we have missed the most are working shoulder-to-shoulder and face-to-face, mentoring students, building peer-to-peer discussions and teams, and bringing theory to life in our labs. We've come a long way and learned a lot about the advantages of recorded lectures and remote delivery and collaborations. We want to capture those lessons for some of our courses as we build the future in new ways. We love having access to all of our alumni for online events, and seeing some faces that could not otherwise join us. These moments have provided special joys, with a kind of intimacy that makes up for some of what we have lost.

A year ago, I don't think any of us anticipated that our campus would remain closed for a full year. The rapid pivot and adaptation of our entire operation proved the incredible commitment our faculty have to learning. In a very literal sense, even a pandemic could not stop the drive to teach our young engineers – nor could it stop their drive to learn. Our 2020 grads completed the final weeks of their degrees and the class of 2021 continued with their studies online for a full academic year. Faculty continued their research throughout the shutdown, with labs reopening in June 2020, and our staff pivoted their support of the college in some really remarkable ways. Throughout the entire year, the cheerfulness, resilience, and energy of our staff, faculty and students have buoyed our entire community.

In spite of the dramatically increased workloads people have shouldered to shift to remote operation, people in the college

have also stepped up to contribute to the COVID response in very meaningful ways. One of the most exciting for me has been the multi-faceted collaborative support we were able to provide to RMD Engineering as they worked to innovate and transcend many obstacles to deliver a remarkable ventilator prototype, ready for validation in six very intense weeks. Five professional colleges were connected to the project, with the College of Engineering making key contributions that you can read more about on page 13. I could not be more proud of our alumni, our staff, our students, and our provincial government. The project really exemplifies what I love the most about Saskatchewan – deep commitment to community, innovation that makes sense, and the ability to transcend disciplinary boundaries to find solutions. While we worked first to serve our rural and remote communities, the result is outstanding technology that stands with the world's best. It is truly engineering the world needs.

Where are you leading the college next?

We have a great team and we need to keep our focus laser sharp as we move through this decade. Our building requires renovation and modernization and we are continuing to build momentum and visibility for this project, which will encompass critical renovations and strategic renewal as we look towards bigger and better things in the future. Our faculty complement and undergraduate programs are continually being renewed and we are entering an accreditation review this fall after a one-year delay due to the pandemic. Our strategic plan will deliver on our economic promise to this province and our students. The steady growth of our new co-op program demonstrates a strong partnership with industry in creating economic opportunity for the future.

Throughout this issue you'll read about many incredible accomplishments over the last three years, from public engagement to more than doubling our research funding in key areas to recruiting outstanding young faculty and recognizing the stellar careers of other faculty members. You can expect much more activity over the next two years. Stay tuned! 🍀

DEAN'S OFFICE

Connection and collaboration with the Dean's Advisory Board

When was the board created?

Terms and membership of the board were finalized in 2019.

What is the board's role?

Though final decisions remain with the college, the board provides insight and guidance in several strategic areas, including curriculum, accreditation, research, commercialization of technology, fundraising and strategic outreach.

Board members are especially attuned to the college's ongoing efforts to better prepare engineering students for their careers.

"The Dean's Advisory Board ensures that our college is responding effectively to Saskatchewan's needs," says Suzanne Kresta, Dean of the College of Engineering.

Who sits on the board?

Alumni, professionals and community leaders – nine in all – bring their knowledge and expertise to the table. They also highlight on-campus activities at the college and USask to the wider world, serving as brand ambassadors.

"We are all honoured to have the opportunity to give back to our community as members of the Dean's Advisory Board, and to contribute insight, perspective and guidance at an intersection of USask and the broader stakeholder community," says chair Tom Kishchuk.

BOARD MEMBERS



Daphne Arnason

Arnason was with PotashCorp for 26 years, working in taxation and audit; she held the position of Vice President, Global Risk Management when she retired. She has a Bachelor of Commerce (Accounting) from USask.



Terry Bergan, P.Eng.

Bergan, a civil engineer who earned his degree from USask, was President and CEO of International Road Dynamics before his retirement in 2018.



Aaron Genest

Genest is an Applications Engineer Manager with Siemens, after the 2018 acquisition of start-up Solido Design. He holds a BSc and PhD in Computer Science, both from USask.



Tom Kishchuk, P.Eng.

Kishchuk, who recently founded TPK Management Consulting Inc., was previously President and CEO of Mitsubishi Hitachi Power Systems Canada, Ltd.

He has a BSc and MSc (Mechanical) from USask Engineering and completed the Ivey Executive Program at the Richard Ivey School of Business.



Larry Long

Long is Senior Vice President Operations, Potash at Nutrien. He earned his BSc in Geology from the University of New Brunswick.



Mike Marsh, P.Eng.

Marsh is President and CEO of SaskPower. He holds a degree in mechanical engineering from USask and an MBA from Queen's. He was the Distinguished Lecturer at

USask Engineering's 2018 C.J. Mackenzie Gala.



Lisa Mueller, P.Eng.

Mueller, who earned her mechanical engineering degree at USask, has more than 20 years technical and business development experience. She is dual-hatting these

days as Vice President, New Ventures with Razor Energy and President of FutEra Power, a wholly owned subsidiary, with all work headquartered in Calgary.



Rob Norris

Norris was a Saskatchewan Party MLA for nearly a decade and held several cabinet portfolios in that time, including Advanced Education, Innovation

and SaskPower. He is currently Senior Government Relations Officer at the Canadian Light Source synchrotron. He holds a Master's degree in political science from the University of Alberta.




June Verhelst, P.Eng.

Verhelst earned her civil engineering degree at USask and is Senior Vice President, Mining and Energy, at Graham Industrial.



Suzanne Kresta, P.Eng. (Ex Officio Member)

Kresta became dean of the College of Engineering on Jan. 1, 2018. Before that, she was a professor of chemical engineering

at the University of Alberta for 26 years. Kresta, a chemical engineer, is editor of the Handbook of Industrial Mixing and Fellow of the Canadian Academy of Engineering. 

Cultivating innovation

2018-2021 USask Engineering strategic plan update



Strengthening Our Strategic Pillars:



Teaching and Learning

- Redesigned first-year program – RE-ENGINEERED – scheduled to launch September 2021
- Engineering Co-op Internship Program introduced September 2020.



Research and Discovery

- Outstanding candidates recruited for seven externally funded faculty chair positions
- Carey Simonson appointed Associate Dean Graduate Studies and Special Projects to prioritize and expand graduate programs



Indigenization and Inclusion

- Sustainable funding secured for Indigenous student supports
- Indigenous Resource Centre established in Engineering Building
- Number of female faculty doubled, just surpassing the national average for engineering
- Calculus removed as an admission requirement, eliminating an obstacle for students from rural and remote communities



Community Engagement

- Dean's Advisory Board created for strategic insight and guidance
- Revitalized marketing highlighting the college's mission #EngineersTheWorldNeeds
- Shifted our student recruitment messaging from "Engineers can do anything" to "There's a place for everyone in engineering"



Embracing Our Guiding Principles:



Inspiring Success

- 22 faculty, including emeriti and joint appointments, identified among the top 2 percent of scientists worldwide in Stanford University analysis
- Two PhD students awarded high-profile Vanier Canada Scholarships



Cultivating Innovation

- Development of a framework for engineering research that is multi-disciplinary, relevant and returns value for our province:
 - Themes: Agriculture, Environment, Health, Mining and Minerals, Sustainable Energy
 - Fundamental Areas: Imaging; Information and Computer Technologies; Transportation and Infrastructure
- Terry Fonstad appointed Associate Dean Research and Partnerships, guiding the strategic direction of the research portfolio and promoting the college as a collaborative partner



Building Respect

- In honouring the strengths of diverse perspectives, an Indigenous Cultural Contextualization unit is part of the RE-ENGINEERED first-year program redesign



Delivering Value

- Relevant and timely COVID-19 research
- Collaboration with Saskatoon's RMD Engineering on development of made-in-Saskatchewan emergency-use ventilator

The achievements of USask Engineering alumni between 2018 and 2020 illustrate that they are among the most accomplished engineers in Canada and around the world. Congratulations to all!

Alumni awards and achievements

Angie Bugg (BE'85 Mechanical) was nominated for a YWCA Women of Distinction Award in the Research and Technology category in 2019. She has developed a specialization in energy management and is currently an Energy Conservation Engineer with the Saskatchewan Environmental Society.



Bugg



Cherry

John Cherry (BE'62 Geological), a world-renowned hydrogeologist was named the 2020 Stockholm Water Prize Laureate for discoveries that have revolutionized understanding of groundwater vulnerability.

Joe Deutscher (BE'85 Chemical and Biological) was one of the featured panelists at The Plastics Puzzle, a panel conversation hosted by the college in 2020 to discuss single-use plastics, the circular economy and the role we play as consumers. Deutscher, who recently retired after a long career with Dow Chemical, brought industry perspective to the discussion. He was also the 2019 C.J. Mackenzie lecturer. *Scan the code to learn more about the event.*



to the discussion. He was also the 2019 C.J. Mackenzie lecturer. *Scan the code to learn more about the event.*



Desjarlais

John Desjarlais (BE'11 Mechanical) is the president-elect of the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS), after serving a one-year term as vice-president. Desjarlais, a Cree-Métis man from Northern Saskatchewan, was also co-chair for the Canadian Indigenous Advisory Council to the American Indian Science and Engineering Society (AISES).

Matthew Dunn (BE'04, MSc'10 Mechanical) was awarded the 2020 McCannel Award from APEGS, recognizing his service to engineering in public education. Before returning to his roots as a practising engineer in 2021, Dunn was the Indigenization and Reconciliation Coordinator in the Office of the Vice Provost Indigenous Engagement at USask and prior to that he was the



Franks

Indigenous Peoples Initiatives Coordinator with USask Engineering.

Lisa Franks (BE'07 Mechanical), a three-time Paralympian, was named an honorary colonel with Canadian Forces Base Moose Jaw, a position awarded to distinguished Canadians to serve as ambassadors to the public and help foster esprit de corps for the troops.

Ron Graham (BE'62, DCL'13 Civil) with partner Jane (BE'62) celebrated the opening of the Ron and Jane Graham Sport Science and Health Centre at Merlis Belsher Place in May 2019. It was funded in part with their \$2.068 million gift. In October 2019, the Grahams announced a \$1 million donation to USask's College of Education to create the School for the Scholarship of Teaching and Learning.

Kevin Hudson (BE'91 Electrical) received the 2019 McCannel Award from APEGS in recognition of his commitment for helping to build a sustainable energy future, including providing professional development in environment and sustainability, collaborating on innovative energy projects, and volunteering with students and teachers on sustainability issues.

Digvir Jayas (PhD'87 Agricultural) was recognized with an Earned Doctor of

Science at the 2019 USask spring convocation. Jayas, Vice-President (Research and International) at the University of Manitoba, is recognized around the world as the leading expert on grain storage and handling, helping Canada maintain its global reputation for marketing high-quality agricultural commodities.

Nicholas Kaminski (BE'13, ME'19 Civil) earned the APEGS Promising Member Award in 2019. Kaminski, a structural engineer, was recognized for his commitment to volunteerism and governance. He has volunteered with several engineering organizations and was on the board of the Saskatoon Public Library. He also has governance designations from the Johnson Shoyama Graduate School of Public Policy and the Institute of Corporate Directors and Rotman School of Management at the University of Toronto.

Kai Li (BE'13 Civil) earned the Promising Member Award from APEGS in 2020. After arriving in Saskatchewan from China in 2008, Li was involved in several extracurricular activities at USask and continued to volunteer in several roles within Saskatoon's engineering community.

Li was also the recipient of the 2020 Association of Consulting Engineering Companies – Saskatchewan (ACEC-SK) Young Professional Award, recognizing his career progress as a structural engineer.

continued on next page

Kenneth Linnen (BE'72 Civil) was honoured with the Brian Eckel Distinguished Service Award from the APEGS in 2019, after a career that spanned both the public sector and the consulting field. He was in charge of the consulting team for several Regina subdivisions, infrastructure improvements on 15 First Nations communities, and the Global Transportation Hub.



Michael Nemeth (BE'08 Mechanical) received the 2020 Environmental Excellence Award from APEGS. A mechanical engineering consultant, Nemeth is an expert in building to the Passive House standard, an international low-energy building standard. In Saskatoon, he founded an eight-unit housing development designed to these standards.

Adeola Olubamiji (PhD'17 Biomedical) has received several recent awards and accolades. She was named one of Canada's 100 Most Powerful Women in 2020 by the Women's Executive Network. She was also recognized as one of RBC's Top Canadian Immigrants in 2020 and received the 2020

STEP (Science Technology Engineering and Production) Award from the Manufacturing Institute. In 2019 she was a L'Oreal Paris Women of Worth Canada Honouree and also received the Influential Women in Manufacturing Award from Putnam Media.

Harold Orr (BE'59, MSc'63 Mechanical) was invested into the Order of Canada in 2019, in recognition of his integral role in improving energy efficiency and conservation in Canadian homes. He was a key driver of the Saskatchewan Conservation House project, which led to new national energy conservation protocols for Canadian buildings.

Dennis Paddock (BE'68 Civil) was awarded the Brian Eckel Distinguished Service Award from APEGS in 2020 after a career managing transportation and municipal infrastructure projects with the Saskatchewan government. He also spent 23 years as Executive Director and Registrar of APEGS, overseeing the revision of The Engineering Act to The Engineering and Geoscience Act and growing membership from 3,600 to more than 13,000 during his tenure.

Harpreet Panesar (MSc'05 Civil) received the Exceptional Engineering/Geoscience Project Award in 2020 from the Association of Consulting Engineering Companies – Saskatchewan (ACEC-SK). He has provided technical input for major projects including the Regina Bypass, Warman and Martensville Interchanges, Estevan Bypass and Saskatoon Freeway.

Don Poon (BE'79 Civil) received the Association of Consulting Engineering Companies – Saskatchewan (ACEC-SK) Mentor Award in 2019 for his dedicated mentorship at Saskatoon's SAL Engineering Ltd., showing a genuine interest in the intellectual and personal growth of his mentees.

David Manz (BE'72, MSc'74 Agricultural) was named a fellow of the Canadian Academy of Engineering. Manz invented a filter that brings safe, clean water to millions of people and freely shared the technology. He was inducted to the Alberta Order of Excellence in 2018.



Don Seaman (BE'47 Mechanical, LLD'19 Hon.) was honoured with a Doctor of Laws at USask's 2019 spring convocation. With his brothers, Seaman was a key player in the development of the oil industry in Alberta and Saskatchewan. The Seaman Engineering and Drilling Company became Bow Valley Industries, a major energy company that eventually had 15 subsidiaries. After retiring from Bow Valley in 1988, Seaman formed DRS Resource Investments, pursuing interests in the nurturing of oil and gas service companies and in land development.

Engineering Advancement Trust (EAT) Alumni Service Awards

Created in 2019, the EAT Alumni Service Awards recognize the selfless volunteerism, long-term dedication and passion for engineering education of each honouree. Because of their dedication, the EAT continues to flourish today.

2019

Dean Peter Nikiforuk: Though not a USask Engineering alum, the EAT felt Dean Nikiforuk was certainly deserving of recognition, as it was his 1978 fundraising campaign that was the precursor to the EAT. In that campaign, he encouraged graduating students to help fund updated equipment for the Engineering Building's new addition. Nikiforuk passed away in 2018.

Art Dumont (BE'67 Mechanical, DSc'92 Hon.): Dumont earned a reputation as one of USask's most influential fundraisers and ambassadors in Alberta. He helped establish the Calgary Engineers Fundraising Committee and served as an EAT trustee for more than 20 years. He was also a welcoming presence for many young alumni in Calgary. Dumont passed away in October 2019.

B.J. Seaman (BE'45 Mechanical, LLD'12 Hon.): Seaman supported Dean Nikiforuk's inaugural fundraising campaign and joined the EAT's first board of trustees in 1986. He served on the board for more than 25 years. Seaman passed away in April 2021.

Al Schreiner (BE'63 Mechanical): For decades, Schreiner has been a continuous pillar in the friend raising and fundraising efforts of the EAT, Calgary Engineers and FOCUS (Friends of the College of Engineering at the University of Saskatchewan). He recently became the EAT's first lifetime honorary trustee.

2020

Wayne Clifton (BE'63 MSc'66 Civil, DSc'96 Hon.): Clifton was a founding trustee of the EAT and its first chair, a position he held for more than 20 years. His gifts of time, talent and treasure were an important source of strength for the college. His long-term involvement with the EAT provided an opportunity for a wide network of people to maintain their connection to the college.

John Niedermaier (BE'63 Agricultural): Niedermaier contributed more than 30 years of continued service as an engaged alum, from leading the Friends of the College of Engineering at the University of Saskatchewan (FOCUS), to chairing the Fundraising Committee. He ensured many young alumni had a positive volunteer experience and still continues to make campaign calls.

Got something to celebrate? Let us know!

We'd love to let the USask Engineering community know about your recent awards or achievements. Drop us a line at donella.hoffman@usask.ca

USask Engineering answers the call

College of Engineering shows it's ready to step up and collaborate – at every level – with an industry partner.

✍ BY DONELLA HOFFMAN

As the COVID-19 pandemic started overwhelming health-care systems around the world in March 2020, University of Saskatchewan (USask) College of Engineering alum Jim Boire (BE'96) decided that designing and manufacturing an emergency-use ventilator (EUV) was simply the right thing to do.

And that's what he and his team did. Within nine months, their ventilator was developed and had received COVID-19 Medical Device Authorization from Health Canada. Along the way, Boire's company became Saskatchewan's first licensed medical device manufacturer – an accomplishment he's now building on.

“What do you need?”

In mid-March 2020, shortly after the World Health Organization declared that COVID-19 was a global pandemic, Boire received a phone call from his daughter, an ICU nurse at Royal University Hospital in Saskatoon.

There may not be enough ventilators, she told him. At that time, North Americans had been hearing about doctors in Italy who were rationing life-saving health-care and equipment, including mechanical ventilators, which take over the work of breathing for a patient and get more oxygen into their lungs. (Please see graphic on page 15.)

Boire, president of Saskatoon-based RMD Engineering Inc., felt he had to do something. He and his team began developing a ventilator, which ultimately became the EUV-SK1.

It was a decision that not only impacted his company, but his career.

“It was the right thing to do,” he says. “If you know you have a team of people that can pull a rabbit out of a hat, you can't not act.”

The first prototype was built in less than a week and put RMD on the path to becoming Saskatchewan's first medical device manufacturer, via its subsidiary, One Health Medical Technologies.

Though Boire knew what his team was capable of, he recognized that it wouldn't be enough to get his foot in the door with USask and the College of Medicine – home to the end users he needed to consult.

“If you're going to start knocking on doors, asking people to trust you, you have to have some credibility.”

In late March, he called Suzanne Kresta, Dean of the College of Engineering, and invited her out to see RMD's ventilator project.

It wasn't their first meeting. Boire was one of the industry representatives invited to sit in on candidate presentations in 2017 during USask's search for a new engineering dean. “She was very forward-thinking and very progressive,” he recalls.

continued on next page

Jim Boire with one of the EUV-SK1 ventilators this spring at RMD Engineering in Saskatoon.

Photo by Gord Waldner

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I approached Suzanne, one engineer to another, and asked if she would afford us a visit to talk about what we were doing.

And that's the way she is, she just said, 'OK, you have my attention. What do you need from me?'

JIM BOIRE

//



What is a mechanical ventilator?

A mechanical ventilator comprises a computerised box that sits on top of a mobile trolley in a hospital (though the EUV-SK1 is contained in a Pelican-brand equipment case). Modern mechanical ventilators have one or more screens, dials, data cables, power cords and gas tubes. They are highly complex and sophisticated pieces of equipment, allowing adjustments such as:

- how long inhalation for a patient lasts
- how much air is received
- how often air is received
- the concentration of oxygen within the air (air is about 21% oxygen, but in some cases the percentage of oxygen is increased)
- how much pressure the patient's lungs are inflated to
- the temperature and humidity of the air

-Berto Pandolfo, Senior Lecturer, Product Design, University of Technology Sydney

In addition to her work as an academic, Kresta is a chemical engineer who is recognized internationally for her expertise in industrial mixing. It was this knowledge of manufacturing processes that Boire wanted to capitalize on, ultimately seeking to have Kresta validate RMD's capacity to develop a medical device.

"I approached Suzanne, one engineer to another, and asked if she would afford us a visit to talk about what we were doing. And that's the way she is, she just said, 'OK, you have my attention. What do you need from me?'"

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Timelines are important in business and we understood this was critical to keep the project moving.

SUZANNE KRESTA

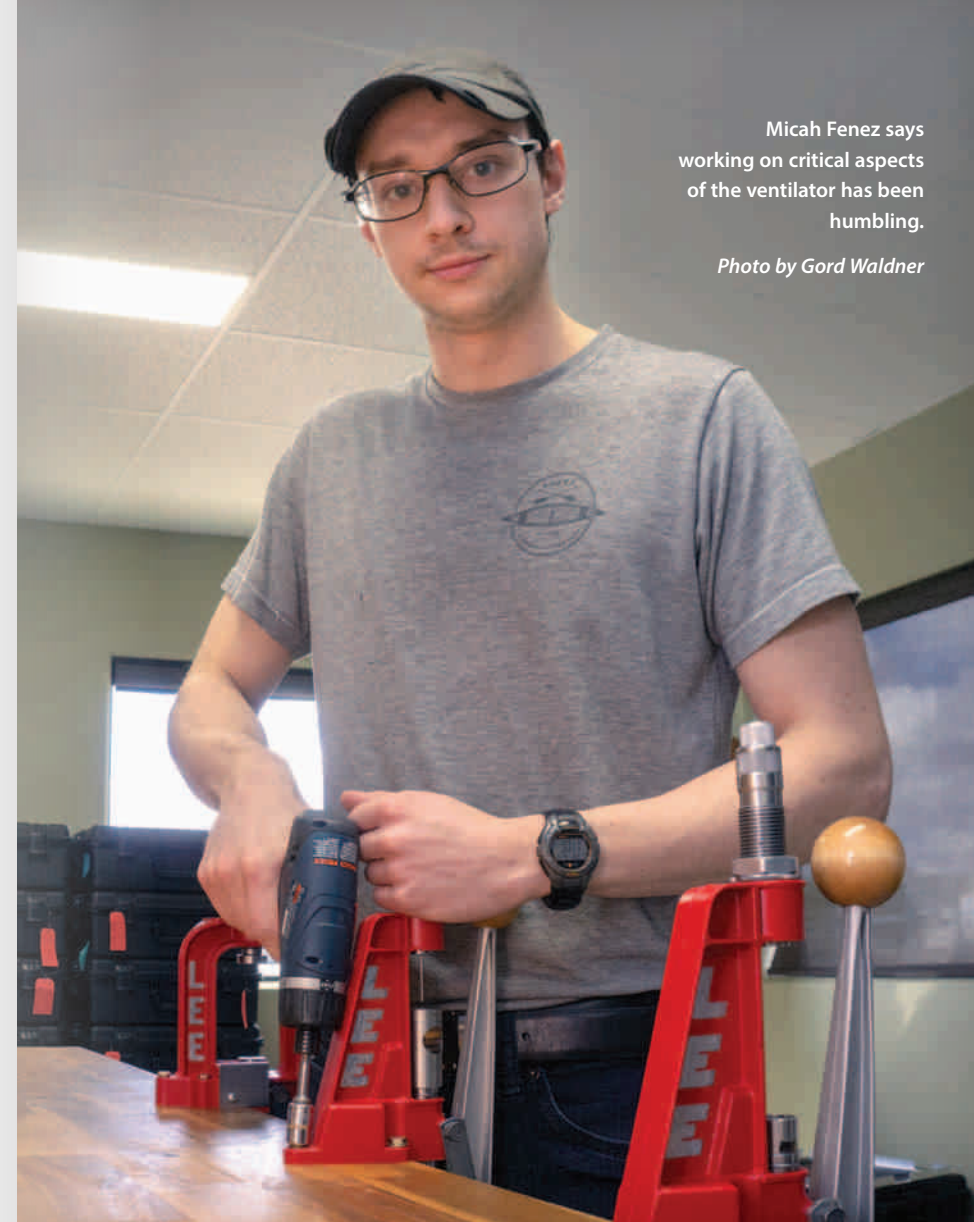
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On a Sunday night in late March, Kresta spent three hours at RMD, touring the facility and learning about the ventilator from Boire. She was impressed enough to conclude that the project was feasible and saw there was a role for USask expertise. That night, she called Preston Smith, Dean of the College of Medicine, putting in motion a collaboration that would reach into several corners of the university.

"This project has been so aligned with Saskatchewan values," Kresta says. "There was such a high level of partnership and innovation – because each of the players saw that there was a problem to solve and we believed we had the resources right here to solve it."

Boire says Kresta's support provided the credibility needed to open more doors at USask.

"None of this would have happened with-



Micah Fenez says working on critical aspects of the ventilator has been humbling.

Photo by Gord Waldner

out her, and I know she says she didn't do anything but she did. It's being that person, in that role, that makes her own decision and trusts you. That was very, very appreciated."

"We just build things and design things that work"

Along with the urgency that arose as the COVID-19 pandemic intensified, there was another complication: with Chinese digital component supply chains severely disrupted, Boire and his team found that many of the parts they needed were suddenly unavailable.

In the course of solving this immediate problem, Boire took the initial steps that have ultimately had a huge impact on RMD's strategic direction.

RMD quickly adapted and simplified the design of the EUV-SK1. Rather than using turbines to control flow, they use proportional solenoids instead. There are only four moving parts in the ventilator.

While the first prototypes used outsourced solenoids, there was no guarantee RMD could secure ongoing supply at a reasonable price.

So, as many generations of Saskatchewan farmers and entrepreneurs have done when confronted with a problem, Boire came up with his own solution: RMD would design and manufacture its own solenoids.

Boire was a journeyman machinist before going back to school to get his engineering degree and knew the equipment he needed to start producing solenoid compo-

nents. He specifically had in mind a 1970s-era Hardinge-brand lathe, highly sought after because of its precision, accuracy and versatility.

Though Boire had tracked down and purchased his own Hardinge machine for RMD, it wouldn't be delivered until May. He also knew that the Engineering Shops at the College of Engineering had two of the lathes in question, purchased new back in the 1970s for about \$60,000 apiece.

"No one makes a lathe that's comparable," says Blair Cole, Engineering Shops manager, of the prized equipment.

With his machining background, Boire understood their capabilities as well. "Those lathes are an icon in the industry. You can do things on them that you can't do with modern lathes," he says, referring to their ability to produce very small items to very precise specifications.

With the lathes sitting idle after the college had ceased in-person operations in March, Boire struck a deal to borrow them until his own arrived.

In lieu of paying a rental fee for the seven weeks it used the lathes, RMD donated equipment back to the Engineering Shops: lathe tools and accessories that staff had had on their wish lists for years.

While lending out the college's equipment is not an everyday practice, Kresta says the timing made sense and considers it an important part of the college's collaboration with RMD.

"Timelines are important in business and we understood this was critical to keep the project moving," she says.

The solenoids are just one example of RMD's resourceful approach to sourcing components for the initial EUV-SK1: everything from flow metre valves to the electrical circuit boards were made in Saskatchewan.

"It's important to have this capacity here," Boire says. "This is where you've got all the ingenuity of every farmer in every corner of this province, so there's things that we can do here because for some reason we don't believe in those boundaries and we just build things and design things that work."

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Because of the pace of the project, we got to see the design get all the way through to completion.

It was neat seeing it happen in such a short amount of time.

CHANDLER JANZEN

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Boire consults with two team members tasked with assembling ventilators.

Photo by Gord Waldner

“This experience has made us better at what we do”

The halls of the College of Engineering are usually buzzing during March as students push to finish quizzes, assignments and labs before finals hit.

But in March 2020, in-person activity screeched to a halt when USask closed its campus.

Employees like Chandler Janzen, a support engineer in the Department of Electrical and Computer Engineering (ECE), suddenly found themselves at home.

He is one of five professional engineers who works in the electrical and computer engineering labs. Each runs the undergraduate lab class in their area of specialization and supports students when needed, in addition to providing technical advice for grad students and researchers.

After helping students complete their final

lab remotely, Janzen and his colleagues planned to spend the coming months converting in-person labs for online delivery.

Then a former student, now working at RMD, reached out for help with the electrical circuit boards they were designing for the new project the company was working on – a made-in-Saskatchewan ventilator.

“Working on a ground-up design is a very different process and they were feeling like they had hit the wall,” says Janzen. “So, they were looking for some mentorship and technical advice, and some manpower to help them get through what they were stuck on.”

With the college labs at a standstill, three ECE support engineers were seconded to RMD: Janzen, who specializes in computer engineering; Rory Gowen, whose specialty is digital signal processing, and Peyman Pourhaj, who specializes in analog and digital microwave sensors.

Given the tight timelines that RMD had given itself, work on the project was intense, but enjoyable, Janzen says.

“It was a good experience. I was always thinking about it, even when I got home. It was like, ‘OK, what’s the next step.’

“And it was really nice, because of the pace of the project, we got to see the design get all the way through to completion. It was neat seeing it happen in such a short amount of time.”

The ECE engineers, along with RMD’s team, developed the circuit board layout that controls the ventilator’s functionality.

“They were very engaged and they were very good at what they did,” says Boire, describing the work of Janzen, Gowen and Pourhaj, who worked in partnership with his own employees.

“I’m very proud that my team took this on, even though it was a little scary to jump

into. It was a big confidence boost for them.”

Boire has since purchased equipment that allows RMD to build the circuit boards in-house and which he hopes will facilitate more collaboration between the college and RMD.

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We were clear with them that this was different. This is a never-happen-again-in-your-life moment.

They had to grow up instantly. They were rock stars.

JIM BOIRE

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gram put out the call, Boire interviewed six students, hired all of them, and then kept them extremely busy.

Among other things, they put together new vertical mills that would manufacture ventilator parts and constructed the ventilator assembly room. Because the ventilator was still in development, they had to sign non-disclosure agreements.

Boire says he impressed on the students the fact that they were working on a brand-new medical device was something special, for RMD and for Saskatchewan.

“We were clear with them that this was different,” he says. “This is a never-happen-again-in-your-life moment. They had to grow up instantly. They were rock stars.”

After the assembly room was built within a couple of weeks, the quick pace continued, says Mitchell Theriau, one of the six summer students.

“Then we had to figure out how the process flows from the shop to that room, and how the inventory would work. So we really started with nothing in the room and ended up with ventilators there in a very short time,” he says.

By the time Theriau returns to school in September 2021 for his fourth year of mechanical engineering, he will have spent 16 months at RMD – a four-month summer job and a 12-month co-op work placement.

Over the past year, he has been involved in writing the work instructions and checklists for assembling the ventilators, which can be up to 44 pages long. “I feel I’ve gotten a lot more involved than an intern usually would. I’m really excited to have had this opportunity,” says Theriau, who is from Calgary.

A second mechanical engineering student, Micah Fenez, also spent 16 months at RMD. As someone who went into engineering with the goal “to learn how to build anything” he says working at RMD has been the perfect opportunity. “What I like about RMD is that it fits with what I want to do,” he says. “They can build anything: they have the equipment and the people that are capable of doing it.”

Along with Theriau, he’s had a hand in developing the stringent process needed to document each component of the ventila-

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tor, a necessity for medical certification. He also spent a significant amount of time last summer researching the flow meter, which controls the volume of oxygen delivered to the patient.

“Because we made the part ourselves, we had to determine every variable that affects that meter. It’s very humbling to know that you’re working on something that’s extremely critical,” says Fenez, a graduate of Saskatoon’s Legacy Christian Academy who will be working on third- and fourth-year classes when he returns to school this fall.

Both students feel their undergrad experience in the college has given them a basic foundation for their work at RMD.

“One thing post-secondary has really taught me is that you need to be able to work under pressure, to work under fairly large workloads,” says Theriau. “I think Engineering really shows you how to handle it.”

Fenez says he is particularly gratified to be working on a unique project, Saskatchewan’s only certified medical device. “As Jim puts it, nobody wants to design a pipe cleaner. We already have those. This is making a difference. It’s something that we need. It’s going to help people.”



The Saskatchewan Health Authority purchased 100 EUV-SK1 ventilators.

Photo by Gord Waldner

“

It was a very, very cool story to be part of, to connect these people and get the right experts in the right place, advising the right people.

PRESTON SMITH

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Kresta is proud to see USask Engineering’s students step up and thrive in the RMD environment. “Well-trained engineers are critical thinkers who can work on complex problems, on teams where people have a range of experience and training,” she says. “In our program, we strive to give students a deep understanding of how ideas move from concepts to the marketplace. And we add hands-on experience so they are ready for the workplace.”

Boire says the workload and the responsibility at RMD was a challenging combination that all of the students met. Reflecting on Theriau and Fenez in particular, he says they made incredible gains in their attention to detail, thinking through tasks, and most importantly, recognizing if something was going wrong and reaching out for more information. “It’s kind of fun watching them grow up of over the course of a year. It’ll be neat to see how they do after this.”

“We can find local solutions”

After she visited RMD in March 2020 to learn about its plans to manufacture a ventilator in Saskatchewan, Kresta knew what had to happen next. Subject matter experts needed to be consulted, to ensure the final product would meet the needs of the medical professionals who would use it.

She’d already been on the phone with Preston Smith, dean of USask’s College of Medicine, to tell him about the project and secure his help in getting the right experts out to the RMD facility.

Smith’s conversations with Boire then led to Dr. Mateen Razzi, who is also the provincial department head of anesthesiology for the medical college and the SHA, checking out the ventilator and bringing in respiratory therapists and clinicians to test the machine and provide their feedback.

“At the end of the day, it’s a manufacturing process and the engineers are going to take the lead on that, but you can’t sell anything to anybody if the end user doesn’t like the product,” says Smith.

“It was a very, very cool story to be part of, to connect these people and get the right experts in the right place, advising the right people.”

In addition to the College of Medicine, contributions were made by other colleges as well. (Please see graphic on page 20.)

“The university’s expertise was critical to pulling this off,” says Kresta.

Both she and Boire believe the project could be a template for future collaboration between USask and industry.

“The university has to take a look at this and go, ‘Wow, this was very high profile, very fast-moving, and it worked. There was a very good result,’” says Boire. “How do we leverage that? How do we now make a pattern for something like this, so that we can have a set of criteria for industry partners that truly want to be a partner?”

“

What we’re trying to do is follow through on our ability to keep medical device manufacturing in the province with a product that will be used world-wide.

JIM BOIRE

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USask Engineering is committed to helping drive innovation in the province, Kresta says, beyond the manufacture of medical devices. It already has close partnerships with SaskPower and with the province’s mining industry.

“When there are local problems, we can find local solutions. And these help us compete in a global economy that values these innovations as much as we do,” she says.

Boire definitely supports nurturing closer integration between industry and academia, rather than writing a cheque and waiting for the results.

“We need to truly set ourselves up to be partners with the university and be collaborative, finding ways to hire students and find ways to do other research projects with each other.”

For his part, Boire has started a master’s degree that he is scheduled to complete in September 2022, unless it turns into a PhD project.

One supervisor is from the College of Medicine and the other is from the College of Engineering.

“If I want to be a partner with the university, I better put my right foot forward and show that I’m dedicated to this and that our company can do the research, and the manufacturing and the interaction with the different departments and colleges at the university.

“We should be ready to show that we want to partner because we want to grow technology inside Saskatchewan.”

“A product that will be used world wide”

By the end of 2020, Saskatchewan’s provincial government had taken delivery of the first EUV-SK1 ventilators, after striking a deal to buy 100 units, to bring the total number of ventilators in the province to 650.

This spring, RMD was manufacturing training units – units that aren’t certified for hospital use – so staff can be trained on the EUV-SK1.

To this point, the company has kept the project low-key within the health-care industry and is instead looking more long-term.

“It is a year later now, so with vaccines coming out, what we’re focusing on now is not more sales, but getting these certified to full-service, full-use ventilators. That’s a big job,” Boire says.

“We’re going to be positioning ourselves for rural and remote areas, air ambulances and ambulances, so they have something more rugged and portable that they can take out and use. They don’t have that capability right now with an acute ventilator. Ours is an acute respiratory ventilator and it will have that ability.”

The journey will not be without hurdles. Companies like Boire’s must have an MDSAP (Medical Device Single Audit Program) certification, which is accepted by Health Canada and the Federal Drug Administration (FDA) in the United States. This requires third-party reviews of the device, which are paid for by the product developer.

The process is expensive, but doable, says Boire, who says the company has added at least a dozen employees since the ventilator project has ramped up.

“What we’re trying to do is follow through on our ability to keep medical device manufacturing in the province with a product that will be used world-wide.”

The goal is to be more self-sufficient the next time manufacture of an innovative, high-level product is needed.

“Do you remember that feeling that you had in your stomach when they said the world is short of ventilators and then they showed all those people dying and then you found out that none of this stuff is made here?” Boire says.

“That’s a terrible feeling and we want to bring quality manufacturing on high-end things back to Saskatchewan, in a way that’s meaningful so the next time it isn’t a big panic.”

In the year since Boire began developing the ventilator, the project has changed to set a new standard for USask collaboration with industry, inspired young engineers and changed the course of Boire’s company as well as his own career. And it began with one engineer reaching out to another.

“None of this would have happened if Suzanne hadn’t taken my call.”

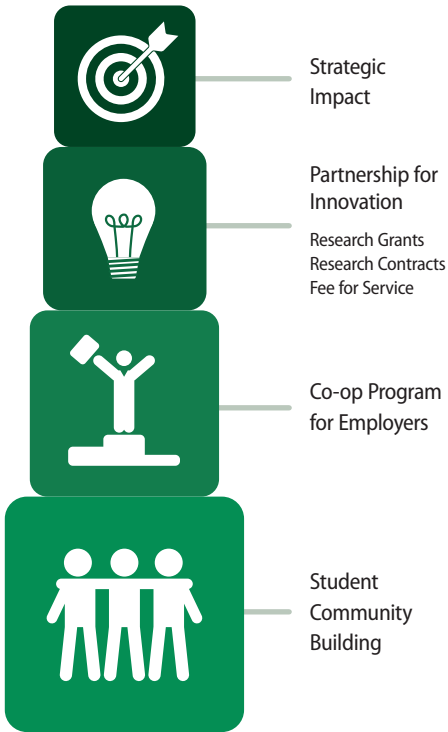
Collaborate with us



Learn more

There are many ways you can build – or continue – your relationship with the college: from lending your time or making a donation, to supporting our alumni or student events. Or you may choose to make a strategic investment to drive innovation in Saskatchewan and beyond.

Levels of engagement



WHERE YOU CAN ENGAGE

HOW YOU CAN ENGAGE

	Technical	Engagement, Mentorship, Research	Corporate Engagement	Who to contact	How they can help
Strategic Impact 	<ul style="list-style-type: none">Support major research initiative of joint strategic importance; establish research chairCo-create strategic initiatives or academic programming	<ul style="list-style-type: none">Become part of the Dean's Advisory BoardServe on the Engineering Advancement Trust Board of Trustees	<ul style="list-style-type: none">Co-create new knowledge and drive innovation to the forefront of Saskatchewan's economic futureEnsure that the workforce of the future is well-positioned to meet the challenges your company expects to face	Suzanne Kresta Dean engr.dean@usask.ca	<ul style="list-style-type: none">Explore partnerships with transformative potentialLearn about our plan and how we are advancing innovation in Saskatchewan and beyond
Partnership for Innovation 	<ul style="list-style-type: none">Fee-for-service researchDefined short-term initiativesData outputs owned by funder25% overhead	Research Contracts <ul style="list-style-type: none">Specialized research for specific initiativeOpportunity for government-matched fundingIP negotiable; flexible for funderFee-for-service researchDefined short-term initiative	Research Grants <ul style="list-style-type: none">Support graduate students and publication of outcomes, as these are tomorrow's core technical expertsOpportunity for government-matched fundsIP negotiable; funder has full and free access to use results of work, including right to patent25% overhead • Multi-year time frame	Terry Fonstad , Associate Dean Research and Partnerships engr.research@usask.ca Heidi Smithson Research Facilitator heidi.smithson@usask.ca	<ul style="list-style-type: none">Explore collaborative opportunitiesUnderstand which research avenue could best meet your needsLearn about our areas of research focus and excellence
Co-op Program for Employers 	<ul style="list-style-type: none">Hire a student for a paid work placement of 4, 8, 12 or 16 months	<ul style="list-style-type: none">Supervise a co-op student in your place of employmentMentor a co-op student during their work term	<ul style="list-style-type: none">Build a pipeline of well-qualified potential employeesFormer co-op students arrive fully trained and have higher retention rates	Kristen Cutting , Co-op Coordinator kristen.cutting@usask.ca Tracy McArthur , Co-op Coordinator tracy.mcarthur@usask.ca	<ul style="list-style-type: none">Learn how to hire a co-op studentDiscover how we can support your recruitment needs with student information sessions, career fairs and speaking opportunities
Student Community Building 	<ul style="list-style-type: none">Be an industry client and/or mentor for a capstone design project	<ul style="list-style-type: none">Join an alumni chapterVolunteer with the Engineering Advancement Trust (EAT)	<ul style="list-style-type: none">Sponsor an event: Safety Days, Hard Hat Ceremony, Capstone Design ShowcaseSupport student design teams and clubs	Carlene Deutscher , Alumni Relations and Events carlene.deutscher@usask.ca Richelle Kenn , Development Officer richelle.kenn@usask.ca	<ul style="list-style-type: none">Get connected as a client or mentor to capstone design coursesIdentify volunteer opportunitiesLearn about event sponsorshipDiscover donation opportunities and student areas of need

RESEARCH

Research with impact

We spoke with internal and external stakeholders as we sought to identify our most impactful and highest priority research areas. This input helped us build our 2018-2025 strategic direction for research at USask Engineering. Our work focuses on five key research Themes and three Fundamental Areas that are instrumental in several themes.



Research Themes

Engineering for Agriculture

Agriculture remains a mainstay of the Prairie economy. USask Engineering has historically played a significant role in developing and supporting this sector, which faces diverse challenges: from responding to and harnessing new information technologies, to getting more and healthier food to the world's growing population while achieving a sustainable environmental footprint. The college recognizes that interdisciplinary approaches are needed to address these complex challenges and opportunities; members from every department are engaged in Engineering for Agriculture.

Engineering for the Environment

This broad category encompasses everything from air, water, and soil quality to sustainable energy and infrastructure. It includes modernizing and updating building and infrastructure standards, responding to a changing climate, developing new and more sustainable materials and energy sources, and better managing our natural resources. Research in this theme seeks to provide solutions for both individuals and industries to reduce environmental footprints and adopt sustainable practices.



Engineering for Health

People in Saskatchewan, and many parts of the world, are living longer but not always healthier. A healthy, prosperous society depends on engineers who can provide technologies and knowledge to make health care more effective, affordable, personalized, and accessible. Working with partners in medicine and health sciences, we strive



to apply knowledge and principles of engineering to provide solutions to complex problems and capitalize on life-changing opportunities. Research in this theme also extends to animal health and welfare, and to One Health – the interface of human, animal, and environmental health.

Engineering for Mining and Minerals

Whether it's potash for fertilizer, uranium for clean energy and medicine, or precious metals used in so many of our technol-



ogies, USask Engineering is focused on partnering with our mining sector to solve challenges it faces in the production of several commodities. These range from geotechnical issues to adopting new technologies for improving safety, efficiency, and environmental stewardship. It's critical that Saskatchewan's industry-leading mineral producers have access to world-class expertise in Engineering for Mining and



Minerals right here in Saskatchewan. USask Engineering is committed to providing and expanding access to that expertise.

Engineering for Sustainable Energy

USask has a long tradition of excellence in power engineering, recently shifting to focus to grid modernization. We are poised to take on new challenges in Engineering for Sustainable Energy. Partnerships with industry tackle the challenges of energy transition both globally and locally. Saskatchewan's geographical challenges include: a small population spread over a large land area with limited water resources; massive demand for transportation of commodities; significant annual climate extremes (-40° C to +40° C); and a high reliance on fossil fuels. We are exploring clean energy technologies, smart power grids, biofuels and improving the energy efficiency of our buildings, industries, transportation, and technologies.

Fundamental Research Areas

Within each theme there are Fundamental Research Areas that support and enhance more than one Research Theme or that have synergies with most or all of the themes. Fundamental Research Areas include:

Imaging

Imaging technologies are seeing ever-increasing application in multiple fields, from health studies and medical diagnostics to understanding plant development and fundamental processes like chemical reactions,

identifying and characterizing materials, and more. Nearly every discipline presents an opportunity to learn from and be advanced by imaging research.

Information and Computer Technologies

Information and computing technologies are essential to advancement in every other discipline.

- Machine learning helps with automation and big data processing.
- Materials research produces better, more efficient sensors and electronic devices.
- Wireless sensors and networks improve communications and help capture enormous amounts of data. They can improve safety and efficiency in many fields, from agriculture and mining to transportation and medicine.

Transportation and Infrastructure

Transportation and infrastructure research impacts progress in multiple themes.

- Agriculture and mining sectors rely on transportation research to ensure reliability, safety, and efficiency in transporting goods to markets.
- Infrastructure research impacts the design of facilities, communications and energy systems, and roadways.
- Traffic research ensures roadways remain safe for all roadway users while ensuring goods can get to market safely. 🇮🇪

RESEARCH

New research and teaching chair appointments to January 2021

New research chairs

Canada Research Chair

The Government of Canada's Canada Research Chairs (CRC) program attracts and retains some of the world's most accomplished and promising minds.

Xiaodong Liang / CRC in Technology Solutions for Energy Security in Remote, Northern and Indigenous Communities / 2020

This is the first CRC of its kind in Canada. Liang's research program is aimed at developing a new system of isolated microgrids, powered by renewable energy such as wind and solar. She is an associate professor in the Department of Electrical and Computer Engineering.

University of Saskatchewan Centennial Enhancement Chairs

USask Centennial Enhancement Chair (CEC) holders are world-class faculty who have made significant contributions to their field nationally and internationally. Their research and scholarship are focused within one of the university's signature areas.

Grant Ferguson / CEC in Groundwater-Energy-Food Nexus / 2019

Ferguson's research focuses on regional hydrogeology, with a focus on deep groundwater systems and the intersection of energy and groundwater resources. He is a professor in the Department of Civil, Geological and Environmental Engineering and the USask School of Environment and Sustainability.

Safa Kasap / CEC in Photonics / 2017

Kasap is a Distinguished Professor in the Department of Electrical and Computer Engineering whose research focuses on photoconductors for medical imaging applications and new photonic devices.

Kerry McPhedran / CEC in Water Stewardship for Indigenous Communities / 2018

McPhedran's research focuses on municipal water and wastewater treatment, industrial wastewater treatment and Indigenous



Liang



Ferguson

water-related research. McPhedran is an associate professor in the Department of Civil, Geological and Environmental Engineering.

Saskatchewan Ministry of Agriculture Chair in Bioprocess Engineering

This chair was created to maximize returns to Saskatchewan's agri-food and bioproducts industries.

Bishnu Acharya / 2020

Acharya's research focuses on generating new, commercially viable products from grains and under-utilized residual biomaterials. He is an associate professor in the Department of Chemical and Biological Engineering, with a joint appointment to the Department of Food and Bioproduct Sciences, College of Agriculture and Bioresources.



Acharya



Kasap

Teaching Chair Appointments

La Borde Chair in Engineering Entrepreneurship

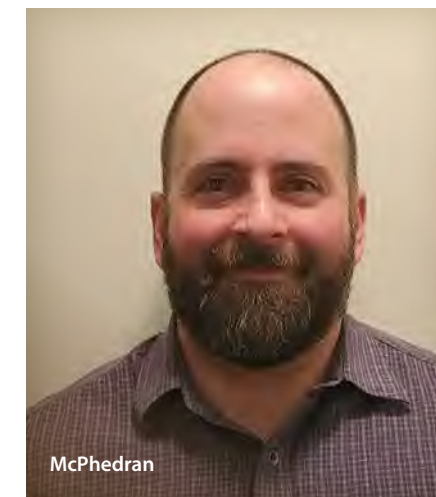
The La Borde Chair provides academic leadership and advanced knowledge in technology-centred entrepreneurship, encompassing project management, technology development and engineering design.

Tate Cao / 2019

Cao supports development and delivery of entrepreneurial courses at USask Engineering, including Technological Innovation Product Design, Innovative Venture Creation and Innovation Strategy. His research expertise includes engineering



Cao



McPhedran

entrepreneurship and technological innovation.

Barbhold Chair in Information Technology

The role of the Barbhold Chair is to ensure course and laboratory content in information technology and digital signal processing maintain industry relevance in the college's electrical and computer engineering programs, ensuring grads are exceptionally prepared for the workplace.

Brian Berscheid / 2017

Berscheid brings a wealth of practical experience to the classroom after working more than 10 years with a local engineering firm. His research includes digital and wireless communications; digital signal processing; broadband cable internet systems; and machine learning.



Berscheid



Wills

D.K. Seaman Chair in Technical and Professional Communication

Through work with students, faculty and practising engineers, the Seaman Chair enhances the teaching, application and understanding of communication in the engineering community.

Jeanie Wills / 2021

Wills is an associate professor in the Graham School of Professional Development, teaching theories of persuasion and practical ways to apply these in the workplace. As Seaman chair, Wills will continue her work on equity, diversity, and inclusion as well as lead the school's plan to develop graduate-level certificates in professional communication and leadership.

These are the research and teaching chair appointments have been made since Thorough was last published. ■

Building success

Yufeng Wang on site at Baydo Towers in the early stages of construction.

Photos by Gord Waldner

Yufeng Wang came to USask as a scholar and emerged as a ground-breaking developer.

✍ BY JOANNE PAULSON

Entrepreneurship was not on Yufeng Wang's radar when he arrived at the University of Saskatchewan (USask) in 2004.

Armed with a scholarship, he came to Saskatoon from China to gain his PhD in structural engineering with the hope of an ensuing career. Even his supervisors, impressed as they were with his work, didn't see his future coming.

"I really enjoyed working with Yufeng. He's a very intelligent man," said Bruce Sparling, associate dean, academic, College of Engineering, who was his co-supervisor with Leon Wegner, department head in civil, geological and environmental engineering.

"He's a very quiet person. He's not somebody who would strike you as someone who would go out and be an entrepreneur. (But) he has this hidden determination. When he decides to do something, he works away at it until he's accomplished it."

Wang left the campus in 2008 and took on a full-time job, his doctoral defense still in the future. Yet in 2010, before he had even convoked, Wang started his own company. It was tiny at first — just himself and a partner. But today, Baydo Development Corporation along with its four sister companies are perhaps collectively best described as a juggernaut by Saskatoon standards.

"That was not the plan when I started university," Wang said in an interview.

"I changed my mind after I started

working for two years. At that time, I realized we had a very good opportunity to start a business."

Despite some impact from the 2008 financial crisis, Wang could see that Saskatoon was weathering the economic storm quite well.

"Our Saskatchewan economy had the best eight years in 2006 to 2014. Actually in 2010, we had the best (economy) in North America. The economy was booming so work opportunities were very good."

Also in 2008, Wang and his wife purchased their own first home. The process of finding and buying a home persuaded him that housing demand was strong. The population was also growing, but the housing supply, in his view, was inadequate. And so, he and his brother-in-law — who had development experience in China — plunged in.

"That's why we decided to start. Risk was low, demand was very strong."

Baydo's first project was a 48-unit, two-phase townhouse development in Stonebridge. With a primary focus on rental space, the company then built Baydo Place, comprised of 118 rentals and 34,000 square feet of commercial space. Two other developments, one with 140 units and another with 228, followed.

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He's come up with innovative ways to solve the problems that add time and cost to a project.

He's really focused on the details of how you build buildings and better ways to do things.

BRUCE SPARLING

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Baydo has been constructing a building named 880 Broadway on Broadway Avenue and Main Street, which will have retail space, office space, eight stories of residential units and two and a half stories below ground for parking.

And now, the company's largest project is just underway. Baydo Towers will be comprised of two 25-storey buildings, rising on the corner of 25th Street and Fifth Avenue downtown. Wang says there will be 460 to 480 units with four underground parking garage levels. With a completion date of 2022, the project's cost is estimated at \$110 million. Wang believes it is the largest residential development in Saskatoon's history, and the location is excellent.

“In downtown we (haven't had) a new building in the last 20, 30 years,” Wang said. “We are across the bridge from the university, the University Hospital, and also the City Hospital is right behind our development.”

Chris Guérette, CEO of the Saskatoon and Region Home Builders' Association, also believes Baydo Towers will be the biggest-ever development. She noted that Baydo was an association member “from day one,” which attests to how serious Wang was and is about doing everything properly.

“They invested in the association; they are very high sponsors. Yufeng and his company have been very supportive, but they're always very humble. They want to make the industry better, not just their business.”

Baydo's leap into the market with a large development was rather surprising, she added.

“It's astonishing. His first project here was a townhouse development with 48 units. Start-up businesses don't do that. It's rare you see companies coming in and going big like this. But he has a different model. He taps into his community and is very supportive of people who come here.

“Just their investment alone, not including the trickle-down effect, has been \$150 million. The effect on the economy is huge.”

Wang's engineering background informs his design and construction process. For example, Baydo and its sister companies, employing 120 to 150 people depending on various factors, are always seeking ways to make building easier and better. When possible, components are built in the shop and brought to site. It is prefabrication, but it does not sacrifice the integrity of the buildings, Wang said.

A rare process in Canada, which may be unique to Saskatoon, is the installation of steel sheet piles — long structural sections that interlock to create continuous walls.

Once the design is complete, Baydo turns the construction over to its sister companies which do concrete foundation work, excavation and paving, exterior finishing and steel manufacturing.

“He's come up with . . . innovative ways to solve the problems that add time and cost to a project,” Sparling said. “He's really focused on the details of how you build buildings and better ways to do things. That comes out of the research.

“In PhD research you have to be innovative; you have to come up with something no one has done before. He was working in a very technically challenging field.”

The PhD project was focused on determining bridge damage by measuring vibration before and after structural problems arose. Sparling explained that structural changes can be very small, and they were investigating more reliable methods of measurement.

“When he did his work, he was very meticulous, careful and dedicated, and kept working away until he had solved the problem. That appears to be the way he's gone about building his buildings.”

In addition to busily building out Saskatoon, Wang has also become involved in the community and remains a supporter of the College of Engineering, having established four scholarships. He has founded the Dr. Yufeng Wang Trust Fund in Structural Engineering, which supports three annual awards: the Graduate Award in Structural Engineering, valued at \$4,000; the Undergraduate Prize in Civil Engineering, valued at \$2,000; and two \$2,000 Undergraduate Awards in Civil Engineering. Wang has committed \$500,000 to the 30-year funding of these awards.

He is also engaged in supporting other businesspeople who come to Canada, in part through the Saskatchewan Chinese Business Immigrants Association.

Adjusting to Saskatoon, he says, was not difficult — not even its winters. He was born in a cold part of China where temperatures can reach minus 20, and he was accustomed to snow.

“The heating systems are better here,” he said. “In China, in some places, you had to wear a jacket even inside.”

Saskatoon is also warm in other ways, a factor in his decision to stay.

“I liked the people. The people are so friendly here. That was the first thing. When I tried to cross the street, all cars would stop. If I didn't know where I was going, people always asked if I needed help. Also we have good water, the air quality is good, there are wide open spaces.”

He has placed Baydo in a relatively unique space in Saskatoon, as a developer, builder, engineering and design firm and building owner. The model doesn't work for most developers, he says; but his background and the need to be careful with costs have led him down this road.

“We own the majority of the buildings, which are built for rental, not for sale. It's a unique structure and business model. We are more efficient because everything is done inside the group. We try to be great, so we have to be special.”

Sparling is delighted to see Wang succeed.

“I'm really thrilled for his success, because he is such a hard-working, nice, humble guy.”

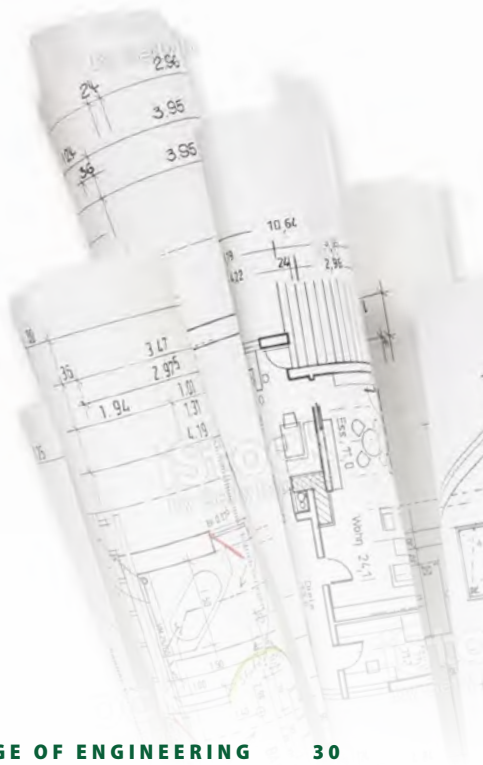
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I liked the people. The people are so friendly here. That was the first thing. When I tried to cross the street, all cars would stop.

If I didn't know where I was going, people always asked if I needed help.

YUFENG WANG

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Majchers make an impact in the mech lab

BY RICHELLE KENN AND DONELLA HOFFMAN

Different paths brought Tyler and Monica Majcher to the College of Engineering but getting engineering degrees was life-changing for both.

Tyler and Monica Majcher with their children Heidi and Clark in Calgary.

Photo courtesy Majcher family

Now proud alumni, the couple wanted to be sure their donation to the college made an impact; their gift to revitalize the mechanical engineering lab does just that.

"We recognized the role the U of S played in our lives," Monica says. "We both felt strongly about engineering because of the opportunities it provided to us."

Monica, who was a Gebhardt when she enrolled in engineering, has continued her family's USask Engineering legacy. Her father, Earl, was a mining engineer who spent most of his career with PotashCorp. Monica and her brothers Stephen (BE 2000) and Brent (BE 2002) all followed in his engineering footsteps. She graduated with a dual degree in geology and geological engineering in 2003.

Tyler is the first engineer in his family. When he was choosing between engineering and business, a family friend took him on a tour of the Co-op Refinery in Regina and offered this advice: "Engineers can do business, but businessmen can't do engineering." Tyler took those words to heart and graduated from mechanical engineering in 2001.

Tyler and Monica didn't cross paths in the college until their upper years, as Tyler was a couple of years ahead. They both found that their classmates became part of their close circle of friends. "The beauty of the U of S is that it draws people from so many different communities," says Monica. "There's a mindset of being open and willing to meet people and build those connections. It's something very unique to the U of S."



Associate Professor Scott Noble in the mech lab with some of the new equipment funded by Tyler and Monica Majcher.

Key contributors to the Mech Lab Revitalization Project: Melanie Fauchoux, Scott Noble, Rob Peace, Shawn Reinink, Hayden Reitenbach and David Torvi.

Photo by Tyrone Keep

After graduation, Tyler and Monica maintained their connection to the engineering college through their alumni network and college events in Calgary. During this time, the pair began considering how they could direct their charitable giving more thoughtfully.

"We just started talking about doing something more cohesively, and then recognized the role the U of S played in our lives," Monica says. This led them to make a meaningful gift to help enhance the mechanical engineering lab, which was stretched beyond capacity.

"The lab program was a bottleneck with data acquisition and capacity limits," says Associate Professor Scott Noble, who spearheaded the Mech Lab Revitalization Project. "We needed to find a way to provide a better learning experience for the students."

Because the program relied heavily on a

few large pieces of equipment, lab scheduling had become problematic and was exposed to the risk of a single point of failure.

The Majchers' funds supported the purchase of two of the six new workstations introduced in the lab in 2020. The new stations allow students to work in small groups, providing more opportunity for hands-on technical experiences that help develop their skills.

Having multiple workstations also improves the continuity of labs, so students can better understand the content and have more exposure to instrumentation and computing for measurement and analysis. "This is important for students. Labs are a huge part of their learning," says Monica.

"The new units have been a game changer," says Noble. "Now students are not running out of time to complete the work because

they've had to share time on a large piece of equipment. Instead, they can experiment on their own and are spending more time looking at the sample and playing with it. Students are developing different ways of thinking because of the upgrades."

"When you compare it to what past students were able to do, this is when the impact of the upgrades hits home," shares Tyler. "This is all relatable on a fundamental level to the work I do now. It's basic mechanical engineering and allows you to work through other areas."

"It feels great to know our gift is tangibly helping engineering students have a better lab experience, because we know how important it is," says Monica. "This has been a great way to give back and we hope hearing our story inspires other alumni to support the college." 🍀

Honouring the journey from struggle to success



McCarthy



Button

BY DONELLA HOFFMAN AND RICHELLE KENN

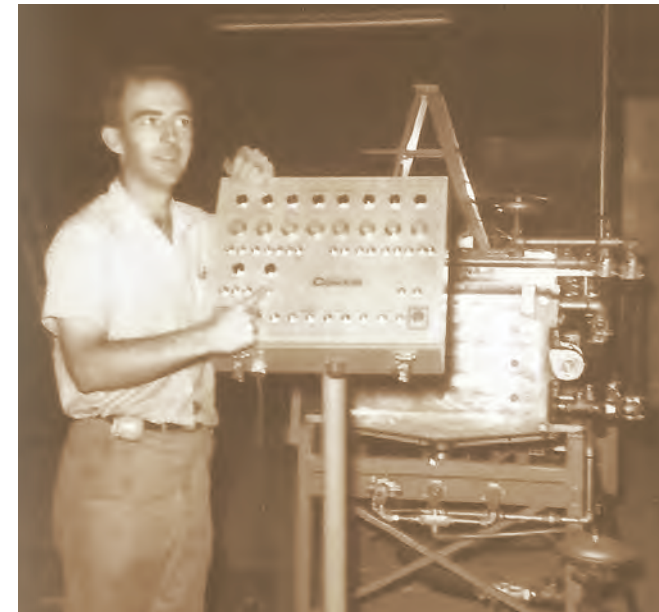
The Grant McCarthy Memorial Award recognizes the mechanical engineering student who achieves the greatest academic improvement.

It didn't take long for Grant McCarthy to put his University of Saskatchewan (USask) mechanical engineering degree to good use. He found a job after graduating in 1959 and even started his own business – Beaver Plastics – that his sons still own and operate today.

But before these successes, there were stumbles.

Left: Morgan Button spent a summer working as a mechanic at a boat shop – an experience which echoes that of Grant McCarthy, who worked in a mechanic's shop before university.

Photo courtesy Morgan Button



Grant McCarthy early in his engineering career (left) and the workshop he built for himself during his teen years (right).

Photos courtesy Sheila McCarthy



Grant grew up on a family farm near Corning, about an hour and a half south of Regina. He got his early education in one-room schools and supplemented those lessons with nearly endless tinkering at home. By age 13, he had built a motorbike using a gas motor from a washing machine and had converted several push mowers to gas machines. By 15, Grant had his own workshop, building his own jigsaw and lathe. And if all this wasn't enough, he worked at a mechanic's shop where he bought and fixed up his first car, a Model A Ford coupe.

Though Grant's natural aptitude was obvious, he struggled in his first year of university and was placed on academic probation.

It was a turning point. What Grant lacked in formal education, he made up for with hard work and grit. He returned to USask, mastered the engineering curriculum and improved his grades; by 1959 he had his degree.

After graduation, Grant built a dynamic career with a strong entrepreneurial focus. While working in Edmonton for British-American Oil (now Gulf Canada) and then Polychemical Industries (now drinking cup manufacturer Canada Cup, Inc.), Grant saw an opportunity and created Beaver Plastics. True to his mechanical nature, he designed and built almost all of its manufacturing machines and equipment himself.

In the early years, Grant worked mornings for an engineering firm and at Beaver Plastics through the afternoons and evenings until he was able to draw a salary in 1969. The business grew gradually from a single 1500-square-foot bay to a 120,000-square-foot building. It later expanded with new plants in Chilliwack, B.C. and Uruapan, Mexico. Grant's two sons now own and operate Beaver Plastics, which produces a wide range of expanded polystyrene (EPS) products, including construction materials.

After Grant died in 2017, his wife Sheila honoured his wish to make a gift to the College of Engineering.

"Just before Grant passed away, he said he would like for me to make a donation to the college. He didn't say how, and I thought it should go to someone who wasn't top of the class," Sheila explains.

"Grant always talked about how he had to work his way up in class. I'm hoping that for students it will be a chance for them to continue on with their education and help them financially."

And so the new Grant McCarthy Memorial Award was established. It is presented annually to the mechanical engineering student who demonstrates the greatest academic improvement, in honour of

Grant's dogged determination to remain at USask.

In 2019, the inaugural \$4,000 award was given to Morgan Button, who convoked in spring 2020. Having someone recognize the journey back to academic good standing means a lot, he says.

"You have my thanks for your generosity in recognizing students who have overcome academic missteps," he wrote in a thank-you letter for the award. "It can be a hard slog back to a point where one feels a sense of accomplishment academically, and it's encouraging to know that there are members of the community that recognize this."

When he learned he'd won the award Button says he was elated. He was not only happy to have his improvement recognized but glad he was able to finish his degree without needing to supplement his finances with a part-time job or help from his family.

"Thank you for your generosity in helping students through what can be the most stressful years of our lives. Especially after we've overstretched ourselves in whatever way, shape, or form that caused us to stumble academically and then come back." 🍀

DONORS

A learning experience



 COLLEEN MACPHERSON

Two engineers—one at the very start of his career, the other at the very end—have found a shared understanding that success in the profession is as much about what happens in the community as what happens in the classroom.

Speaking about his experience with his electrical engineering capstone design project, 2020 graduate Landry Warnez said being able to connect in person with the stakeholders in a solar power system he and his classmates designed for a school and medical clinic in Burundi expanded his view of what it means to be an engineer.

"Most of us are not experimental scientists, not working on the fringes of technology," said Warnez. "What we're trying to do is improve people's lives and meeting the people who will benefit not only makes you a better engineer, it helps you grow as

a person. I think that what makes a good engineer is 50 per cent technical skill and 50 per cent your social skills."

Rod Karius couldn't agree more. A class of '76 graduate in civil engineering, Karius is now "99 per cent retired" after a successful 40-year career with Associated Engineering. In the past decade, he renewed his connection to the college by serving as a trustee for the Engineering Advancement Trust Fund and saw first-hand the beneficial impact alumni have on the college.

As he approached retirement, Karius said he found "I had the financial resources to give back to the College of Engineering where I developed relationships that have lasted a lifetime." His goal "was to expose students to real-life experiences relevant to engineering that are sometimes hard to get through summer jobs."

The result of Karius' contribution to the college was the new Engineering Undergraduate Experiential Learning Fund designed to support student projects and initiatives that focus on social responsibility,

social licence and community involvement, "and the electrical engineering project in Burundi couldn't have been a better example of how this fund should be utilized."

The challenge Warnez, Kelvie Lamont, Brayden Heck and Curtis Miller took on was designing a solar power system for Rehoboth School and Hope Medical Clinic in the capital city of Burundi, a land-locked African nation rated the poorest country in the world. The project was proposed to the design team by Claver Karakura, a Burundi civil engineer now living in Saskatoon.

The local power supply is notoriously unreliable, said Warnez, and what the two facilities need to support and expand their operations is solar-generated and battery-stored power for when the grid does down.

"But one of the most difficult things we faced was determining the scope of the project," he said "It's hard for stakeholders to really know what they need and it was hard for us to know how the details were all going to tie together in order for it to work."

The solution was to get eyes on the ground, and thanks to a grant from the experiential learning fund, Warnez was able to travel to Bujumbura, Burundi in February 2020 to take stock of the situation in person. It was two-and-a-half days of travel to get there but well worth the trip, he said.

"It's a really beautiful country and the people take a lot of pride in their school and clinic but they are in rough shape infrastructure wise. It was also interesting that some of the school kids had never seen a white person before; they want to touch your hand, feel your skin."


Warnez was able to get a good sense of what was needed, what would work for the school and clinic, and the local knowledge level. He also sought out Bujumbura vendors that could supply components for the project "and I helped them with some basics of electrical safety, pointing out potential hazards in their yard."

He returned knowing "we had a design that will work, but it's expensive so the project is basically stalled. We're disappointed but

this wasn't a shock." Warnez hopes to get the team back together to look at simplifying the design and reducing costs as well as potential funding sources."

"Sitting in Saskatoon, I sometimes wonder why we're doing projects like this. It's for the marks and to graduate of course, but engineering is more than drawing something up on paper. It's about seeing people very excited that you've come all the way to their country to work on something to improve their facilities. They're very appreciative."

For Karius, being able to contribute to Warnez's Burundi trip through the Engineering Undergraduate Experiential Learning Fund was gratifying.

"It was a huge learning experience for the students to recognize the problem was half a world away and that they needed that face-to-face interaction to fully appreciate the nature of the project. Engineers can't just develop a solution and then look for a problem that fits that solution; the real world works the other way around." 

re-engineered for student success

BY DONELLA HOFFMAN

The University of Saskatchewan (USask) College of Engineering is seeking to create the most effective first-year engineering program in Canada. Dubbed RE-ENGINEERED, it will welcome its first students in fall 2021.

When that happens, it will mark the end of a process that began in 2016.

"We asked ourselves, 'What if we started from a blank piece of paper? How would we do it?'" says Associate Professor Dr. Sean Maw, one of the leaders of the team transforming USask Engineering's first-year program.

Today's engineering grads need a more robust and diverse skill set than ever before. But for the most part, engineering education hasn't fundamentally changed in 100 years or longer, according to Maw, the Jerry G. Huff Chair in Innovative Teaching and a faculty member of the Graham School of Professional Development in the USask College of Engineering.

The team looked at curriculum and also focused on better supporting students' mental and physical health, while keeping them excited about engineering and giving them a solid foundation for upper-years courses. As they built the program, designers were informed by extensive consultation with faculty and students, as well as research on effective instruction, principles for teaching and learning in higher education, and practices that support student success.

The RE-ENGINEERED curriculum was made possible by Ron and Jane Graham, whose generous donation allowed the hiring of a new team of engineering education specialists to develop the curriculum. As the program is implemented, many alumni continue to support equipment and software costs through gifts to the Engineering Advancement Trust.

RESTRUCTURED for student learning and wellness

While engineering students currently have five or six courses that run the length of the semester, RE-ENGINEERED classes will vary in length and intensity, with material sequenced so when students learn knowledge in one course, they can immediately apply it in another. "Think of TV shows that have crossovers. It's going to be like that with the courses," says Maw.

continued on next page

“We will also be pacing things better,” he added, noting that the team of first-year instructors will communicate regularly and co-ordinate assessments so students won’t have one jam-packed week followed by another in which they have nothing due.

First-years will also have a consistent schedule with a common lunch hour so it will be easier for them to schedule community-building extra-curriculars and social events, or simply fit in a workout. “This predictability is good for mature students, people who are working in the evening and for those who have a family,” says Maw.

Optional help sessions are also built into each day, so students can work with their peers and get help from teachings assistants on specific topics.

REVITALIZED curriculum for a stronger foundation

The first difference in the curriculum is the addition of online Summer Top Up courses, so students can identify

and address any gaps from their high school classes – including chemistry, math and physics – before starting first year. In fact, the college rolled out Summer Top Ups in 2020, a year earlier than planned, because in-person learning ended abruptly for Grade 12 students as the COVID-19 pandemic began.

Thanks to the inclusion of shorter courses in RE-ENGINEERED, a broader range of material will be covered, making students more employable after their first year. For example, content covered in students’ first semester, in addition to basics like mechanics and electrical circuits, will include:

- Introduction to the profession and communication
- Calculus; linear algebra, applied to engineering problems
- Short courses in chemistry, biology, physics and geology and how they relate to engineering
- Indigenous cultural foundation
- Design; drawing and sketching; computer-aided design
- Computer programming (Python and Matlab)
- One-day labs introducing students to each of the engineering disciplines

continued on next page

Below: The three program designers, left to right: Joel Frey, Shaobo Huang and Sean Maw.



“There are really no finals?”

Competency-based assessment helps students acquire key skills, without high-stakes exams

Competency-based assessment, or CBA, is a pillar of the RE-ENGINEERED first-year program. Though CBA has been used in medical and teacher education, it is new for engineering education in Canada and its implementation at USask is being observed with interest.

At the June 2021 Canadian Engineering Education Association (CEEAA) conference, USask Engineering presented the paper *Lessons Learned from Using Competency Based Assessment (CBA) in a First Year Engineering Statics Course*, which related its experience piloting CBA in an online GE 124 Statics course in 2020-21. It was awarded Best Engineering Education Practice paper at the conference.

These are some of the key points from the paper, authored by Sean Maw, Shaobo Huang, Duncan Cree, Glyn Kennell and Wendy James. Please scan the QR code to read the full paper.

Assessment in a typical Canadian undergraduate engineering course

In most courses, classic summative assessments are used: assignments, quizzes, mid-terms and final exams; grade weightings are applied to each assessment, e.g., the final exam is worth 50 percent of the course grade.

These traditional assessment methods do not clearly distinguish between skills or understandings that a student is proficient

with, in comparison to those where they may have gaps.

For instance, the final exam grade gives an overall picture of performance. However, for mid-range grades, it is not immediately clear what has been learned or how well it has been learned. In addition, many skills or processes are only assessed once in traditional models, and if a student does not understand something, the course (and the student) moves on.

Using a competency-based assessment system

Determining what students need to learn

Once overall goals for a program are agreed upon, each course is closely examined through the lens of what is essential for students to know and do so they can be successful in later courses or in the profession. These competencies are written as learning outcomes (LOs) and can include knowledge, concepts, skills, and processes.

Structuring the assessments

In the case of the GE 124 pilot, the CBA version of the course was broken into three modules, each with a module test, superficially similar to a midterm, and there was no cumulative final exam.

Within the modules, the assignments, quizzes, labs, and module tests consisted of questions and exercises that addressed a

variety of the course’s learning outcomes (LOs).

The LOs were assigned weights within the overall course grade, as opposed to assigning weights to the assessments themselves (labs, mid-terms, final), as would happen in a conventional course.

Students could overcome poor performances in early assessments of LOs, as better later results on the same LOs would replace their earlier lower results. A key feature of this approach was that students had at least two and typically three or more opportunities to exhibit competence with respect to the course’s LOs.

Another key aspect of this CBA implementation was dividing the course material into three levels or types. Type A materials were the most basic building blocks of the course i.e., basic definitions, calculations, and concepts. Type B materials were basic integrative problems e.g., solving a basic 2D or 3D particle or rigid body equilibrium question, or solving a basic truss. Type C materials were advanced or tricky integrative problems that probed deeper understanding and required more adaptive problem solving.

Students were required to demonstrate a minimal level of competency in the LOs in order to pass the course. Specifically, they had to pass all of the Type A materials and achieve a weighted average of at least 70%

on Type B materials. They did not have to meet any performance standard for the Type C materials.

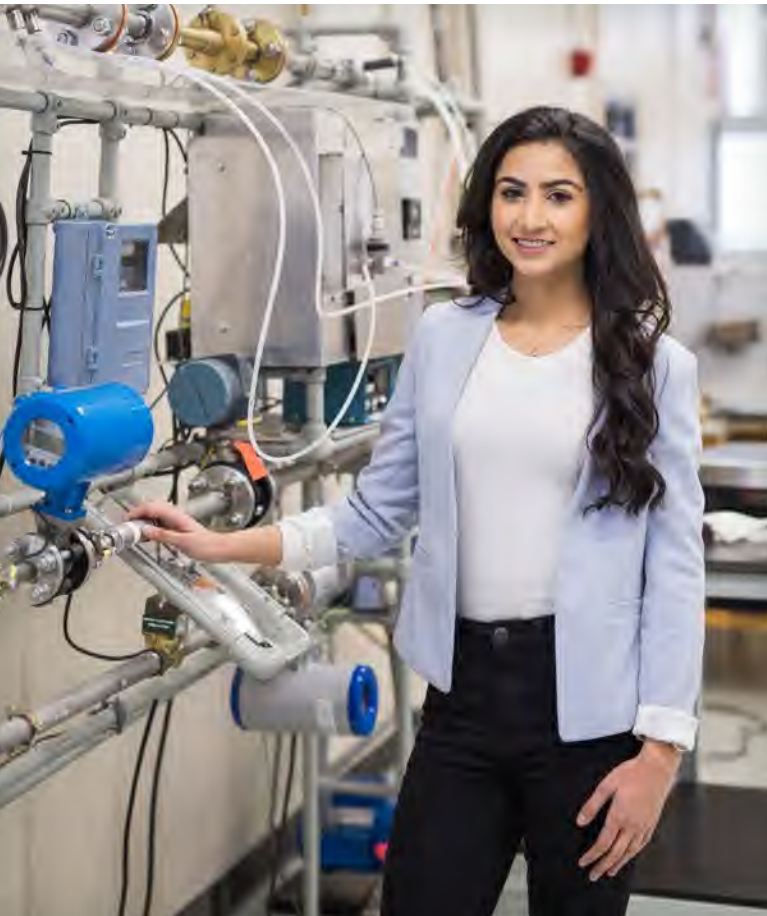
How it went

Based on the experience gained, and on student feedback from the 2020-21 year, CBA can work for engineering and it can work well. Challenges are present, but they appear to be manageable. As expected, staff workload is the primary challenge. However, it was observed and students noted that the flexibility in the system can work well for accommodating life challenges. Students also really appreciated the forgiving nature inherent in CBA. They noted it as being a fairer assessment system, and many suggested that they actually learned better through CBA. It gives students more time to show that they can do the work required of them.

In addition, three of the instructors who had taught GE 124 previously felt that the quality of the final work in each module was superior to final exam results of past years. 🍀



Learn more



Early in the program, students will also learn about peer teaching, so they will be equipped with the tools to help each other during their program.

“The best way to learn is to actually teach the concepts. We think it will have a powerful impact on the way students work together,” says Joel Frey, one of the three program designers and an assistant professor who is jointly appointed to the Graham School and the Department of Electrical and Computer Engineering.

As well, an Indigenous cultural contextualization course will be taught during the first month of the program.

“We want all of our engineering students to understand the unique relationships that exist in Canada and certainly within Saskatchewan. The U of S, especially on Treaty 6 Territory and the Homeland of the Métis, has a unique place in the world,” says Frey, who with Maw and assistant engineering professor Shaobo Huang, led design of the RE-ENGINEERED program.

REFOCUSED grading to build a stronger foundation

Students won’t find the work easier, says Maw, but the environment will be more supportive. Although there are no final exam periods, students will be tested on modules of content throughout their courses using competency-based assessment, something pretty new for Canadian engineering education. (See assessment story on page 40.) The final exam periods in December and April will be used for discipline-specific, hands-on learning.

The idea is to ensure students have a stronger foundation in the basics they’ll need for the rest of their degree. For instance, they will need to achieve a mark of at least 70 per cent on material involving facts, concepts, basic computations, and procedural steps, as well as basic integrative problems in the course. There will be no minimum standard for the very advanced material. “They have to do pretty well on the founda-


tional material. If they don’t do well on an early test of a learning outcome, they will get a second or third chance to do better,” Maw says.

Overall, it will be a more constructive environment for learning.

“We want to minimize the academic attrition by supporting the students better and by co-ordinating what we’re doing across the courses better. It won’t be easier, but it will be more supportive and thorough,” says Maw.

It will also ensure students have the information they need to determine if they’re making the right career choice.

“If they know what engineering’s about and they know what the related sciences are about earlier, they can make a better decision earlier whether engineering is for them.”

The overall goal will be preparing a stronger crop of USask Engineering grads. 

Many working together

Many contributors from the College of Engineering and across USask helped bring the RE-ENGINEERED first-year program to life. Thank you to everyone for your co-operation, insight and faith in our idea.

USask College of Engineering

Faculty & staff

Rebekah Bennetch
Brian Berscheid
Alana Bitsuie
Greg Blenkin
Adam Bourassa
Kristen Cutting
Myles Desipeda
Matthew Dunn
Andrea Eccleston
Richard Evitts
Sarah Gauthier
Adam Hammerlindl
Chris Hawkes
Warren Helgason
Glyn Kennell
Andrew Kostiuik
Majak Mapiour
Christopher Martin
Kerry Mazurek
Douglas Milne
Aleksandra Pajic
Noreen Predicala
Brad Schmid
Sandra Terry
Travis Wiens

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Jim Bugg
Robert Johanson
Mehdi Nemati
Debbie Rolfes
David Torvi
Leon Wegner

Associate Deans

Terry Fonstad
Aaron Phoenix
Carey Simonson
Bruce Sparling

RE-ENGINEERED leads

Joel Frey
Shaobo Huang
Sean Maw

Dean

Suzanne Kresta

USask College of Arts & Science

Gary Au
Alexandra Bartole-Scott
Samuel Butler
Ian Burgess
Gap Soo Chang
Adrian Clark
Lenaic Couedel
Michael Cuggy
Alexis Dahl
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Tom Ellis
Michael Horsch
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Christopher Todd
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Brian Zulkoskey

Dean

Peta Bonham-Smith

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Andrew Bueckert
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Ryan Downey
Brittany Dugas
Carmen Giesbrecht
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Susan James
Dayna Johnson
Adam Jones
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USask Student and Enrolment Services

Lauri Hovdestad
Eileen Zagiel

Unwavering support from Ron & Jane Graham

Ron and Jane Graham’s support of the RE-ENGINEERED project has been transformational, allowing our college to bring our redesigned first-year program from concept to reality. Ron and Jane’s unwavering support and encouragement during RE-ENGINEERED’s five-year development tremendously impacted the quality of the program. Thank you for sharing our vision, trusting us to accomplish it and empowering us to do things differently for our first-year students. You are inspiring our students and our graduates to achieve success!

FACULTY AND STAFF

Faculty and staff achievements

Awards and accolades faculty and staff received from 2018 to 2020, during Thorough's hiatus, show an impressive range of achievement. We are proud of how they represent our college and USask. (Each faculty member's department is listed in parentheses.)



Oon-Doo Baik (Chemical and Biological) was awarded the John Clark Award from the Canadian Society of Bioengineering (CSBE) in 2018, noting his research on the use of electro-technologies for food processing and storage applications, heat and mass transfer processes, extraction of bio-components and biomass processing.

Distinguished Professor Emeritus Roy Billinton (Electrical and Computer), received the Lifetime Achievement Award from the Institute of Electrical and Electronics Engineers (IEEE) Power & Energy Society in 2019. Billinton, who established USask's Power Systems Research Group, is recognized worldwide as a pioneer in power system reliability, economics and performance.

Jim Bugg (Mechanical) was awarded the College of Engineering's Provost's Teaching Award in 2018. Winners of this award exemplify active learning and curiosity, strive for teaching excellence, assess fairly, continuously enhance their teaching practice and provide educational leadership.



Daniel Chen (Mechanical, Division of Biomedical Engineering) was inducted into the Canadian Academy of Engineering (CAE) in 2019, one of the highest professional honours for an engineer in Canada. His citation states: "Chen is an international leading scholar in bio-fabrication. He displayed remarkable vision and leadership in initiating and conducting a series of successful research collaborations across the University of Saskatchewan and worldwide."

Chen was also named a Fellow of the Engineering Institute of Canada in 2018, which recognized his "significant progress and breakthroughs in design and fabrication of scaffolds for various tissue engineering applications." That year, he also received the outstanding achievement award from the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS), which cited his leadership of his interdisciplinary tissue engineering research program.

C.Y. (Tony) Chung (Electrical and Computer) was named an Engineering Institute of Canada (EIC) Fellow, recognizing him as "a prominent leader for advancing academic activities and applied research in power systems engineering development in Saskatchewan." Chung is the NSERC/SaskPower Senior Industrial Research Chair in Smart Grid Technologies and the SaskPower Chair in Power Systems Engineering.



Dale Claude was awarded the 2017-18 USask Staff Excellence Award for his contributions as lab manager in the Department of Chemical and Biological Engineering. Claude was a key figure in the development of the college's outstanding chemical engineering labs, which are recognized as among the best teaching labs in the country. He retired in 2018 after a 39-year career.

Distinguished Professor Ajay Dalai (Chemical and Biological) received several accolades in 2020. He was awarded the Royal Society of Canada's Miroslaw Romanowski Medal for his outstanding contributions to environmental science. It noted he is an internationally renowned chemical engineer who has conducted leading edge research on renewable energy, heavy oil and gas processing, and environmentally safe remediation of wastewater and waste gas streams.

In January 2020 Dalai was also granted the title Distinguished Professor by the University of Saskatchewan, recognizing the national and international impact of his research, which significantly enhanced his field. As the Canada Research Chair (CRC) in Bioenergy and Environmentally Friendly Chemical Processing, he is the longest-serving CRC at USask.

Dalai also received Canada's highest honour for chemical engineers in being named recipient of the R.S. Jane Memorial Award from the Canadian Society for Chemical Engineering (CSCHE). The society noted Dalai's innovative research has resulted in numerous international publications and that he has developed and patented many processes and catalysts that have impacted the Canadian petroleum and bioenergy industry.

Allan Dolovich (Mechanical) received a 2019-20 Teaching Excellence Award from the University of Saskatchewan Students Union. Students from Dolovich's Mechanical Engineering 313 class nominated him for the award, which recognizes those who have taught with enthusiasm and organization and demonstrated fairness in evaluation, providing exceptional commitment and support to their classrooms.

Grant Ferguson (Civil, Geological and Environmental), whose research focuses include climate change and water security, and groundwater and hydrogeology, received the 2019 Research Excellence Award from the USask Global Institute for Water Security.

Joel Frey (Electrical and Computer, Graham School of Professional Development), was named the Saskatoon Engineering Society's 2019-20 Educator of the Year. His nomination cited his positive attitude and approachability. Frey, who is helping to lead the redesign of the college's first-year program, was also commended for his ability to gain cross-campus support for the new program.

Terry Fonstad (Associate Dean Research and Partnerships; Civil, Geological and Environmental) served as president of the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) in 2019-20 and recently concluded his term as past-president on the APEGS Executive Committee.

Glenn Hussey (Physics and Engineering Physics) was selected in 2019 to become a fellow of Engineers Canada (FEC), honouring his exceptional contributions to the engineering profession in Canada.

J.D. Johnston (Mechanical) received a University of Saskatchewan Students' Union (USSU) Teaching Excellence Award in 2018, which recognizes those who have demonstrated enthusiasm, organization and fairness in evaluation, providing exceptional commitment and support to their classrooms.

Rajesh Karki (Electrical and Computer) was honoured with an Engineers Canada Fellowship (FEC) in 2018, recognizing his work in service to the engineering profession.

Safa Kasap (Electrical and Computer) was elected in 2019 as a fellow member of The Optical Society (OSA) "for outstanding contributions to the research and development of radiation detectors for high-dose high-resolution radiation measurement, x-ray imagers, and for understanding optical properties of a wide class of materials."

continued on next page

Suzanne Kresta (Dean; Chemical and Biological) was elected as a fellow of the Canadian Academy of Engineering (CAE) in 2018. Over her career, she has worked in 20 different industrial sectors on turbulent, multiphase mixing problems ranging from drinking water to metal extraction.



Kresta



Rolfes



Simonson

Sean Maw (Graham School of Professional Development; Jerry G. Huff Chair in Innovative Teaching), is a member of the inaugural class of Fellows of the Canadian Engineering Education Association (CEEA), recognizing his leadership in engineering education. Maw, who helps lead the USask Engineering team redesigning the college's first-year program, has been a key organizer and leader within the CEEA.

Maw also received the College of Engineering's Provost's Teaching Award in 2020. His nomination noted his passion for exploring new ways to help students learn and his work to develop virtual reality software to learn about truss design. His willingness to spend as much time as needed with students and his authenticity in the classroom were also cited.

Dena McMartin (Civil, Geological and Environmental) joined USask as assistant vice-president research in 2017 and became Associate Provost, Institutional Planning and Assessment in 2019. On July 1, 2021 she became Vice-President (Research) at the University of Lethbridge. We are grateful to her for her contributions to USask and our college during her time in Saskatchewan.

Venkatesh Meda (Chemical and Biological) was named a fellow of the Canadian Society of Bioengineering (CSBE). The award recognizes his significant contributions to agricultural, food and biological engineering, particularly in the areas of post-harvest engineering and value-adding processing of foods.

Meda also received the 2018 Glenn Downing Award from the CSBE, which noted his "enthusiasm continues to thrive on integrating approaches to food systems ultimately addressing global food security challenges."

Professor Emeritus Karim Nasser (Civil, Geological and Environmental) was invested as a member of the Order of Canada in 2018. A newcomer to Canada from Lebanon, he was a professor in the college for more than 30 years who was known for his research and inventions in building technology. He invented the K-Slump

Tester, a device that measures the consistency of concrete and which was first used in the construction of the CN Tower. A property developer, philanthropist and engaged volunteer, he generously gives back to USask, as well as supporting health care and the arts.

Akindede Odeshi (Mechanical) was named a fellow of Engineers Canada (FEC) in 2019, recognizing long-standing contributions to the engineering profession.

Saman Razavi (Civil, Geological and Environmental; School of Environment and Sustainability) was selected in 2020 as the University of Bristol Benjamin Meaker Distinguished Visiting Professor on the topic of Building Resilience in Complex Water-Human Systems. It is that school's leading international research partnership.

Razavi also received the 2019 Canadian Geophysical Union Young Scientist Award, recognizing the quality and impact of his research. He is the principal investigator of the Integrated Modelling Program for Canada, for prediction and management of change in Canada's major river basins.

Debora Rolfes (Graham School of Professional Development) received the Friend of the Professions Award from the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) in 2019, recognizing her contributions to the professions, including her service on the APEGS disciplinary committee. She was also appointed an honorary fellow of Engineers Canada.

Rolfes was also winner of the Provost's Award for Outstanding Teaching in the College of Engineering in 2019 and in 2018 received a Teaching Excellence Award from the University of Saskatchewan Students' Union.

Carey Simonson (Mechanical) was a finalist for the Award for Outstanding Graduate Mentorship from the Canadian Association for Graduate Studies in 2018. "Dr. Simonson's mentoring philosophy is to nurture responsibility and independence

through direct supervision, facilitated teamwork and guided collaboration," his nomination stated.

Professor Emeritus Hugh Wood (Electrical and Computer) was honoured in 2019 when the electrical engineering undergraduate laboratory 2C74 was officially renamed the Doc Wood Lab. This honours Wood's ongoing academic and administrative contributions to the college, including development of the Digital Signal Processing stream in Electrical Engineering.



Wood

USask Engineering faculty on Stanford's worldwide "Top 2%" list

In October 2020, Stanford University published a comprehensive list identifying the **top two percent of living scientists worldwide**, after analyzing the citation metrics of nearly seven million authors from 1965-2019. "It is the first classification that systematically ranks all the most-cited scientists in each scientific field," wrote author Prof. John Ioannidis. A total of 22 USask Engineering faculty, including emeriti and joint appointments, are on the list.

Roy Billinton (ECE)	Jim Hendry (GIWS)	John Pomeroy (GIWS)
Lee Barbour (CGE)	Gordon Hill (CBE)	Carey Simonson (MECH)
Xiongbiao (Daniel) Chen (MECH)	Rajesh Karki (ECE)	David Sumner (MECH)
C.Y. (Tony) Chung (ECE)	Safa Kasap (ECE)	Jerzy Szpunar (MECH)
Ajay Dalai (CBE)	Suzanne Kresta (CBE)	Fang Xiang Wu (MECH)
Jay Famiglietti (GIWS)	Xiaodong Liang (ECE)	Howard Wheeler (CGE)
Madan Gupta (MECH)	Ha Nguyen (ECE)	Chris Zhang (MECH)
	Ding-Yu Peng (CBE)	

CBE = Chemical and Biological Engineering, **CGE** = Civil, Geological and Environmental Engineering, **ECE** = Electrical and Computer Engineering, **GIWS** = Global Institute for Water Security, **MECH** = Mechanical

FACULTY

New faculty members revitalize USask Engineering

Many talented new faculty members have joined the college between 2017 and Jan. 1, 2021; it has been a period of significant renewal. We're proud that each of these talented engineers are part of our USask Engineering community.

Bishnu Acharya, PhD / Associate Professor / Saskatchewan Ministry of Agriculture Chair in Bioprocess Engineering / Chemical and Biological / 2020



Acharya came to USask via the University of Prince Edward Island, where he was Associate Professor in the Faculty of Sustainable Design Engineering, leading a research program in the emerging area of bio-mass conversion to bioproducts for chemical, material and energy applications, using circular bioeconomy.

Research expertise: Cellulose-based biomaterials, biochemicals and nanocomposites; thermochemical and biochemical conversion technologies.

Amira Abdelrasoul, PhD / Assistant Professor / Chemical and Biological / 2017



Abdelrasoul joined USask Engineering from Ryerson University, where she was a lecturer and postdoctoral research associate. She is currently the principal investigator of the Membrane Science and Technology Research Centre at USask.

Research expertise: membrane science and nanotechnology for energy and water sustainability; biometric and bioinspired nanomaterials for biomedical applications and

advanced technologies; process modeling, simulation, and optimization of complex systems

Donna Beneteau, MSc / Assistant Professor (Academic Programming Appointment) / Civil, Geological and Environmental; Mining Option / 2019



Beneteau joined USask Engineering from industry in 2011, first as a Research Engineer in the rock mechanics lab and then as a full-time instructor in 2015 when the college's mining options were established.

In addition to her research and teaching duties, she supervises the Rock Mechanics Laboratory.

Research expertise: Canadian mining history, mine backfill; mining education; rock mechanical properties; seismicity

Brian Berscheid, PhD / Assistant Professor (Academic Programming Appointment) / Barbhold Chair / Electrical and Computer / 2017



As Barbhold Chair, one of Berscheid's roles is to maintain industry relevance in the college's electrical and computer engineering programs. He brings a wealth of practical experience to

the classroom after working more than 10 years with a local engineering firm.

Research expertise: digital and wireless communications; digital signal processing; broadband cable internet systems; machine learning

Lori Bradford, PhD / Assistant Professor / Graham School of Professional Development / 2021



Bradford, who holds a PhD in Social Psychology, a Masters in Environmental Studies and BSc in Biochemistry, joined USask Engineering from the School of Environment and Sustainability (SENS).

She is jointly appointed to SENS and teaches courses for both SENS and the College of Engineering, with expertise in applying research conducted in social science and policy fields to engineering design practice.

Research expertise: Indigenous water knowledge; water policy; water empathy; social determinants of health; engaged scholarship

Tate Cao, MSc / Assistant Professor / La Borde Chair in Engineering Entrepreneurship / Graham School of Professional Development / 2019



Cao, who completed his MSc in biomedical engineering at USask, holds an MBA from the Edwards School of Business. Prior to joining the college, he was a Research Support Specialist in the USask

Research Services and Ethics Office. As La Borde Chair, he supports development and delivery of entrepreneurial courses at USask Engineering.

Research expertise: engineering entrepreneurship and technological innovation; tissue engineering; medical instrumentation.

Joel Frey, PhD / Assistant Professor (Academic Programming Appointment) / Graham School of Professional Development; Electrical and Computer / 2019



Frey rejoined USask Engineering in 2017 as first-year curriculum developer after practising as a consulting engineer and in 2019 he was appointed to college faculty. He is part of the core team for the design, development and implementation of RE-ENGINEERED, the new first-year program.

Research expertise: engineering education; decolonizing and Indigenizing engineering education

Shaobo Huang, PhD / Assistant Professor (Academic Programming Appointment) / Graham School of Professional Development; Mechanical Engineering / 2019



Before joining USask, Huang held the Stensaas Endowed STEM Chair at South Dakota School of Mines and Technology. In addition to her engineering degrees, she has also completed a B.Ed at the University of Calgary. She

is one of the core team members developing RE-ENGINEERED, the college's new first-year program.

Research expertise: measurement and assessment in engineering education; curriculum design; global engineering education; K-12 STEM education

Suzanne Kresta, PhD / Dean, Professor / Chemical and Biological / 2018



Kresta joined USask Engineering as dean on Jan. 1, 2018 after 26 years at the University

of Alberta. She has been recognized with a number of national and international awards for her research, teaching, and leadership.

Research expertise: turbulent mixing; multi-phase flow; process kinetics

Xiaodong Liang, PhD / Associate Professor / Canada Research Chair in Technology Solutions for Energy Security in Remote, Northern, and Indigenous Communities / Electrical and Computer / 2019



Prior to joining the Department of Electrical and Computer Engineering as an associate professor in July 2019, Liang was an assistant professor with Memorial University in Newfoundland. She also spent more than 10 years with a leading oil field service company.

Research expertise: power systems dynamics, renewable energy integration, synchrophasor technology and smart grids; power electronic devices in power systems; protection of power systems and components; power systems in oil field facilities; electric machines.

Ebrahim Bedeer Mohamed, PhD / Assistant Professor / Electrical and Computer / 2019



Mohamed joined USask Engineering in July 2019 as an assistant professor. He was previously an assistant professor in the School of Engineering, Ulster University, United Kingdom.

Research expertise: applications of optimization techniques in signal processing and wireless communications; design of spectral-efficient and energy-efficient communication systems; waveform design for next-generation communication systems; internet-of-things (IoT); applications of artificial intelligence in signal processing and communications.

Simon Papalexiou, PhD / Assistant Professor / Civil, Geological and Environmental; Global Institute for Water Security / 2018



Papalexiou is a hydro-climatologist and an expert in hydroclimatic extremes and random processes. He joined USask Engineering in July 2018 from the University of California, Irvine.

Research expertise: analysis of climate model projections; big data and global analysis of hydroclimatic extremes; development of statistical tools to quan-

tify uncertainty and improve predictions; stochastic modeling in water resources and hydroclimatology; time series analysis

Laura Smith, PhD / Assistant Professor / Civil, Geological and Environmental / 2019



Smith, who earned her PhD in hydrogeology at USask, worked in a variety of industry and government before joining the college's Geological Engineering faculty.

Research expertise: aquitard hydrogeology and characterization; engineering geology; hydrogeochemistry; in situ testing

Sandra Terry, MA / Lecturer / Graham School of Professional Development / 2019



Terry, who earned her Bachelor of Arts (Honours) at Trent University and her Masters in Post Colonial Literature at Queen's University, was a long-time lecturer in the college's Graham School

of Professional Development prior to her appointment becoming permanent in 2019.

One of the key courses that she teaches is Effective Professional Communication, which prepares students to negotiate the political, rhetorical, ethical and interpersonal challenges of communicating in a professional environment.

With gratitude

We express our thanks to the following faculty members for bringing their skills and insight to the college. We wish these talented engineers every success in their new endeavours.

- Sarah Gauthier, 2017-2021, Assistant Professor
- Jocelyn Peltier-Huntley, 2019-2020, Lecturer
- Dena McMartin, 2017-2021, Professor & Associate Provost, Institutional Planning and Assessment

COLLEGE

8 things to know about the new

In September 2020, USask Engineering officially launched its new Engineering Co-op Internship Program.

The new co-op program at USask Engineering builds on the success of the Engineering Professional Internship Program (EPIP).

Founded in 1996, the EPIP placed nearly 1,000 students into work placements across Canada, with a focus on Saskatchewan and Alberta.

Key changes that students will see with the new co-op program centre on flexibility, preparation and mentorship. The program is designed to be as inclusive as possible to allow the greatest number of engineering students the opportunity to participate in work placements.

The placements help students see how their classes connect to real-world engineering. Plus, they get a head start on learning professional skills – such as problem solving and collaboration –

Stephanie Lipoth (BE'20 Environmental) during her Saskatchewan Ministry of Highways work term.

Engineering Co-op Internship Program



that help them stand out when they begin their careers.

Here are **eight key things** to know about the new Engineering Co-op Internship Program.

1. Students can now do four-month work terms.

Although both students and employers value long-term placements of eight, 12, and 16 months, co-op now includes a four-month summer option, so students can access the program earlier in their degree. The four-month option also adds greater flexibility for employers.

2. Students can do a work placement after completing their second year of engineering.

Plus, they may choose to do more than one work placement, which only extends their undergraduate degree by one year.

3. Each student will have their own mentor during their work placement.

Students are assigned a P.Eng. mentor through the College of Engineering, in addition to receiving in-depth supervision from their employer at their workplace. Through formal and informal conversations, mentors provide support and advice as students transition from school to a professional workplace. (Please see "Are you mentor material?" on this page.)

4. Students prep for their placements by taking the Introduction to Engineering Co-operative Internship course.

This one-credit course helps students hone their communication and professionalism skills and also covers workplace expectations and etiquette. They'll also learn about how to prep for job searches and interviews and where and how to look for work. The goal is to provide students with skills they'll need as they begin their careers.

5. The college supports students throughout their work placements.

Program coordinators stay in touch with students to maintain their link with the college and ensure students know where to bring their questions. The coordinator also engages each student in reflective learning throughout their placement with ongoing assignments. These build on what students learned in the prep course about the importance of self-awareness and reflection in their growth as young engineers.

6. Students still earn work experience that counts toward their P.Eng. designation.

As with the EPIP, a student may be able to gain up to 12 months of pre-graduation work experience that can be applied towards their qualification as a licensed professional engineer.

7. The USask Engineering co-op program is not a mandatory requirement to graduate.

Completing one or more co-op work terms helps USask students compete with students from other engineering programs where co-op is mandatory. However, if a

USask student isn't able to secure a work placement, they are still able to graduate. This flexibility is helpful when the job market is slow, as it has been with the COVID-19 pandemic.

8. The co-op program helps employers discover future talent.

Employers consider co-op students and interns as part of their talent pipelines. By hiring a student, they can go through a trial period that could result in future employment. Having a student in the workplace is also an opportunity to build or enhance a company's brand amongst other students on campus. 🍀



Are you mentor material?

Mentors make our co-op program better. Here are the highlights of what we need.

We are looking for professional engineers who:

- Want to help students apply their classroom knowledge in professional workplaces
- Are open to helping students navigate potential interpersonal challenges during their work placements (e.g. How to handle conflict in the workplace).
- Will provide constructive feedback on student reflection assignments
- Will share their own experiences about transitioning to an engineering career

What's expected:

- Be a mentor for the first eight months of at least one student's work placement
- Read each student's career reflection assignment and provide feedback
- Have at least three conversations with each student (either in-person or virtually)



Learn more about co-op and mentoring

Paying it forward

✍ BY JOANNE PAULSON

Even as a child, Dr. Adeola Olubamiji (PhD'17) saw her future in physics. Now she's guiding others to reach their academic goals.

At a young age, Adeola Olubamiji was regularly exhorted to view and revere two images on the family wall.

Growing up in delicate financial circumstances, these images represented success, determination and contribution. Not to mention inspiration.

"When I was nine years old, on the wall of my living room in my house in Nigeria, my dad had two pictures of my uncles," she related in an interview. "One of them is a professor of nuclear physics and the other one was a clinical professor. They both got scholarships from Nigeria and were living in the U.S., working."

"My dad would talk about them every day. He was proud of them and would challenge us: you could get scholarships, too, if you focus on school."

"One day I told him, okay, I would just get my PhD and he would put my picture up on that wall, but I'll be gone to the U.S. Everyone laughed. As a kid, at that point, I actually meant that," she said.

As an adult, she has actually achieved that, and so much more.

Olubamiji completed her PhD at the University of Saskatchewan (USask) in biomedical engineering in 2017, the first Black person to do so. Today, she is employed at Desktop Metal, a Burlington, Massachusetts company that designs and markets 3D printing systems.

When she graduated from USask, she didn't see this specific future for herself, but she did see something exciting and related to STEM (science, technology, engineering and mathematics): specifically, physics.

"(I) knew there would be new areas of science that we could get into just as my uncle got into the nuclear physics area. As I was just navigating my career I kept looking at, where is the future going? What's new?"

Before her time as a USask student, armed with an undergraduate degree from Nigeria, Olubamiji went to Finland to complete her master's in physics, which included work in materials science. Then it was time to seek the next university for her doctorate.

"I started looking for PhD scholarships. I was looking around the world, anywhere with expertise in medical physics areas . . . and optimization of imaging techniques," she said. "I kept applying. I did about 100 applications, just applying everywhere. Finally, I met my (USask) professor. I saw his page when I was checking the University of Saskatchewan [website] and saw we had a lot in common. I reached out to him and mentioned the key concepts he was working on and how I had utilized them for my master's thesis."

The professor, Dr. James D. Johnston, asked her questions about her work and told her she seemed to be the right candidate. She was then connected to Dr. Daniel Chen (PhD'02), a mechanical engineering professor, who became her main supervisor.

She describes Chen as the sweetest person she had ever met, likening him instantly to a father figure.

"I walked into his office and told him . . . I feel like this is where the future is going and if I don't do this, it will haunt me for the rest of my life. I know that I can do this."

"He looked at me and said, 'Yes, with these credentials, I believe you.' He supported me all through. He was rooting for me. He instructed me, corrected me, and believed so much in my ability," she said. "When people believe in you, you have to work extra hard."

With the support of her mentors, she dove into 3D printing for biomedical applications at USask, exploring its use for cartilage replacement.

"The concept of 3D printing is the same, whether I use it for aerospace or automotive or biomedical applications. Once you have that background, you can transition successfully."

The first transition after graduation took Olubamiji to a Canadian aerospace company using 3D applications, until she was called to Cummins, an American Fortune 500 multinational to do the same work for automotive applications. In December 2020 she became Director, Additive Manufacturing Solutions, at Desktop Metal.

Just as Olubamiji was inspired and motivated by her uncles, she is now hoping to inspire and assist a new generation of Black youth, academically and otherwise.

Representation is important; people cannot be what they cannot see.

They need to see people who look like them who are thriving in engineering.

DR. ADEOLA OLUBAMIJI

The actual vehicle of inspiration came about somewhat accidentally when, one day in 2017, she posted her story on social media.

"I spoke about my experience as a kid, how I was from a home where my parents were not financially stable. I had a picture in my head of what I wanted to become and I had fought for that. I was hoping a young girl could read that article and believe in what is possible.

"The story went viral. I posted it on my Facebook page and I had maybe 400 friends. The next morning I had 5,000 responses, newspapers in Nigeria and CBC were calling me to do interviews and I wondered, what have I done?"

She leveraged the attention to build her non-profit organization, STEMHub Foundation. It started small, by offering to visit communities and do STEM activities on Saturdays with kids in Ontario and has since added mentorship programs for university students, helping them navigate systems and understand which courses they should take to be more competitive in the job market. The foundation also helps students with university applications. Thus far, STEMHub has reached about 5,000 students, mostly in Eastern Canada, and Olubamiji is trying to take the program to Nigeria, as well.

"I was invited to participate in the Nigerian Economic Summit by the government. I sat on the education reform panel with our leaders. During that visit, I was able to see my parents and my uncles. I met my uncle who was on the wall as he is now retired and returned home. It was a good trip."

As of July 2021, Olubamiji had almost 45,000 followers on Instagram and more than 60,000 on Twitter and continues to be passionate about supporting the Black community and other people from foreign countries in Canada and the United States – because it is clear that discrimination and under-representation still exists. Her mission for creating an inclusive society does not stop with her work with STEMHub. She notes universities and other organizations can play a role in supporting foreign students.

"Representation is important; people cannot be what they cannot see. Every student needs motivation for why they should continue. They need to see people who look like them who are thriving in engineering. We need alumni on the walls of every building with equal representation of demographics – age, gender, race," she said.

She says the ultimate goal is to continue widespread diversity and inclusion training as well as wider representation from all cultures on university boards.

Meanwhile, Olubamiji would love to return to Saskatoon, and bring STEMHub training and support with her.

"I lived in Saskatchewan for almost five years and I would really like to give back to the community that raised me." ■

COLLEGE

USask Engineering Indigenous Initiatives

Building respect with inclusion, support, engagement



Our vision

It is our vision – sōhkēyimowin – to provide meaningful access to engineering for Indigenous students and to increase representation of First Nations, Métis and Inuit students in our college and the engineering profession. We celebrate and share Indigenous ways of knowing as an integral part of teaching, learning and research at USask Engineering.

What is Sōhkēyimowin?

“Sōhkēyimowin is a traditional value that means you have a goal, you are going to try hard, you are going to succeed.” – Helen Garvin, Cree teacher and curriculum developer from the Red Earth First Nation

USask Engineering is helping to build a diverse and welcoming Indigenous community in the college, while building connections beyond campus.

While engagement has looked different in a pandemic-impacted world, the college has worked to broaden cultural programming and events within USask Engineering.

“Indigenous engagement is a co-responsibility of staff, students, allies, and leadership,” says Alana Bitsuie, USask Engineering Indigenous Initiatives coordinator. “Engineering students who can connect

with Indigenous history, culture and community will become ever so valuable in solving the future’s most pressing structural and technological needs.”

With support from leadership, faculty, the Engineering Student Centre and the college’s external relations team, there are three key areas where work is focused to help increase access to engineering and improve student retention:

- **inclusion** of Indigenous history, culture, and ways of knowing for all students, staff and faculty in the College of Engineering;
- **holistic support** for Indigenous engineering students;
- **engagement** with Indigenous communities to help solve practical needs and to provide engineering outreach. ■

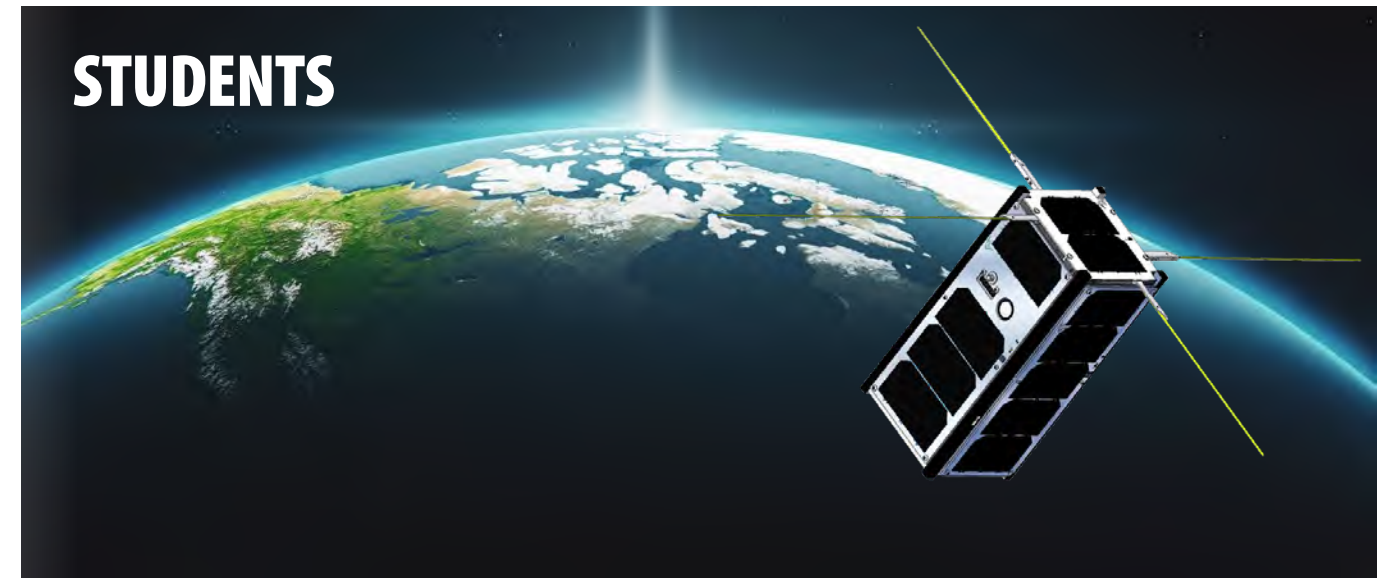


Our USask Engineering Indigenous Initiatives Coordinator

Alana Bitsuie joined the College of Engineering in February 2020.

Bitsuie holds bachelor’s degrees in Psychology and in Native Studies and a Master’s degree in Northern Governance from the Johnson Shoyama Graduate School of Public Policy. Reach her at indigenous.engineering@usask.ca

STUDENTS



Cube satellite mission reaches key milestones

Launch of Saskatchewan’s first-ever
satellite scheduled for late 2022



Dean Suzanne Kresta (left) recently toured the clean room with RADSAT-SK technical project manager Dustin Preece (right) and took a look at some of the satellite components.

Photo by Christopher Elash

BY USASK COMMUNICATIONS

A team of University of Saskatchewan (USask) students developing the province’s first cube satellite (RADSAT-SK) is getting closer to sending its project into orbit.

In recent months, the student group, which includes many USask Engineering students – has successfully completed a critical design review of the satellite with the Canadian Space Agency and the construction of the first satellite-grade clean room in the USask College of Engineering building.

“The COVID-19 pandemic presented our team with many challenges,” says Dustin Preece, a second-year engineering physics

student. “Despite this, the RADSAT-SK team rose to the occasion and made the transition to online collaboration to achieve our goals. I feel really proud of our team for getting the go-ahead on our design, and I am very honoured to be counted amongst their ranks.”

For the past three years, more than 100 USask undergraduate and graduate students have been part of the mission to design, build, and launch RADSAT-SK. The small satellite is entirely designed by the student team, with minimal faculty oversight. The student team members have made all of the engineering design decisions, while project management and finances are also almost entirely led by students.

“It’s thrilling to think that the cube-satellite is going to be tested and constructed at the university,” said Atharva Kulkarni, who is heading into second-year engineering classes. “Getting to be a part of the testing of a real satellite that will go into space is riveting.”

The cube satellite is expected to launch in late 2022, making it Saskatchewan’s first satellite in space. During the one year it will spend in orbit, the satellite will validate a new kind of radiation sensor and test an experimental radiation blocking compound – both developed by researchers at USask.

To date, the team has raised \$100,000 for RADSAT-SK, which supplements a \$200,000 grant from the Canadian Space Agency. ■

STUDENTS

Between 2018 and 2020, our students achieved national and international recognition in several arenas. We are proud of each of them!

Student awards and achievements

Khaled Zoroufchi Benis, who is pursuing his PhD in chemical engineering, was awarded a 2020 Vanier Canada Graduate Scholarship. He is developing an environmentally friendly bio-filter that can remove arsenic from water. The Vanier provides \$150,000 over three years to recipients.

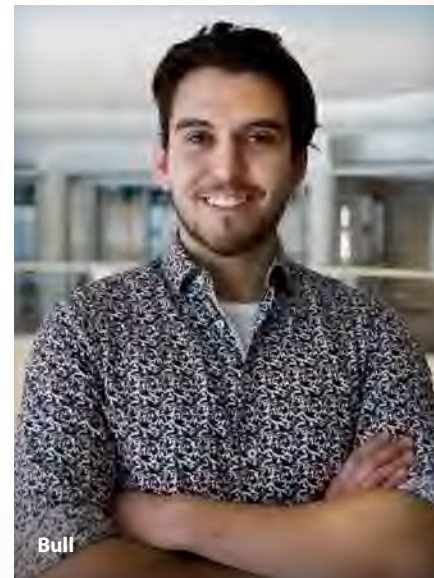
Mechanical engineering master's student **Shaunti Bergen (BE'17 Mechanical)** won USask's 2020 3 Minute Thesis competition in which students have 180 seconds and one PowerPoint slide to explain their research. Bergen's research focused on using fire-resistant hydraulic fluid in underground potash mines.

Harrison Bull (BE'17 Chemical), working toward his master's degree in civil engineering, earned a Research Award at the 2020 USask Indigenous Student Achievement Awards. Bull is researching water treatment and environmental remediation.

Amy Bunyamin (BE'17 MSc'20 Mechanical) won the Best Clinical Science paper in the 2019 Life and Health Sciences Research Expo. Her research explored using high-resolution bone scans to assess the strength of a person's wrist bone and whether they are at risk of future bone frac-



Bergen



Bull

tures. Bunyamin completed her Master's degree in Mechanical Engineering in 2020.

Brendan Carbert, Cory Ingram and **Jordan Himmelsbach (BE'20 Computer)** shared in the \$10,000 top prize at the 2020 Edwards School of Business InVenture Business Plan Competition. Their project centered around Bowl Butler - technology that allows livestock producers to remotely monitor water supply for their animals.



Kripki

The team of **Liam Gray (BE'19 Engineering Physics)**, **Skylar Koroluk (BE'19 Engineering Physics)**, and **Bion Larson (BE'19 Engineering Physics)** finished in the top 10 percent of 10,000 teams competing in the 34th annual Mathematical Contest in Modeling in 2018 and were one of only two Canadian groups named a meritorious winner.

Zenon Kripki (BE'19 Chemical) received the 2019 Engineers Canada Gold Medal Student Award. Kripki, who graduated with a degree in chemical engineering, served two years as president of the Canadian Federation of Engineering Students. He also served as coordinator of Spectrum, the college's student-run engineering showcase.

Roland Macana (MSc'19 Biological) won USask's 3 Minute Thesis competition in 2018 after presenting his research on using radio waves to kill insect pests in stored grains. Macana received his master's degree in chemical and biological engineering in 2019.

Evan Machibroda (BE'20 Civil) was the winner of the Huskie Athletics Male All-Around Athlete Award – the Rusty



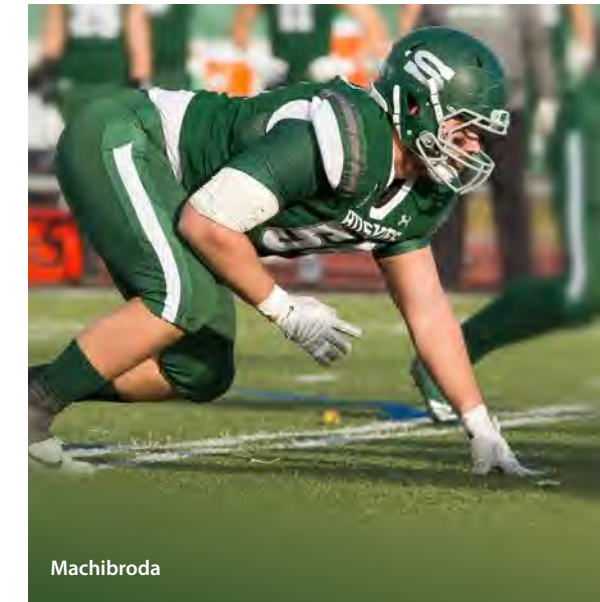
Sami

McDonald Cup, which recognizes the Huskie athlete who exhibits the highest qualities of sportsmanship and citizenship during their career. Machibroda, a defensive lineman, was drafted in 2019 by the Canadian Football League's Edmonton Football Team.

Bryce Marcotte (BE'16 Environmental), a PhD student studying geotechnical engineering, submitted the top paper in the 2020 North American Geosynthetics Student awards program, as judged by a panel of four geosynthetics experts who evaluated 14 papers. Marcotte received \$1,000 and travel expenses to the Pan American Conference on Geosynthetics.

Biomedical engineering PhD student **Adam McInnes (MD'15, MSc'20 Biomedical)** was awarded a 2019 Vanier Canada Graduate Scholarship of \$150,000 over three years to develop a new gel and scaffold design to promote tissue growth for 3D printing of artificial organs that may one day be used for transplants.

Amir Rezaeivahdati (MSc'19 Civil) received the 2019 Outstanding Master's Thesis award from The Masonry Society (TMS), a scientific and technical organization that advances the knowledge and use



Machibroda

of masonry around the world. His thesis, supervised by Professor Lisa Feldman, reported the results of an investigation of a specific design method for walls as included in the Canadian masonry design code.

Scott Read (BE'17 Environmental, MSc'20 Civil) received a Best Student Paper award at the Canadian Society for Civil Engineering conference in 2019 for his paper that explored the economic, socio-cultural and environmental value of the Meewasin Northeast Swale in Saskatoon.

Mattland Riley (BE'20 Mechanical), who was a USask Huskies offensive lineman, was selected seventh overall by the Saskatchewan Roughriders in the 2020 Canadian Football League Draft.

In 2020, fourth-year electrical engineering student **Samia Sami** was named one of Canada's Top 25 Environmentalists Under 25 by The Starfish Canada, an organization that supports and celebrates young Canadian environmentalists. The award recognized her research into renewable energy and her leadership of a project to implement solar-powered heated bus shelters in Saskatoon.

continued on next page

The American Concrete Institute (ACI) recognized USask with an Outstanding University Award for student activities in 2018. initiatives were led by Professor Lisa Feldman and then-graduate student **Bjorn Vors (BE'17, MSc'20 Civil)**, who earned the Daniel W. Falconer Memorial Fellowship offered through the ACI Foundation, which included a six-week internship at the ACI headquarters.

Hao Zhang (MSc'16, PhD'20) was awarded the Madan and Suman Gupta Award for the best engineering PhD dissertation in 2020. Zhang developed an



Zhang

artificial intelligence computer model that makes apps and operating systems safer, faster and more energy efficient when used on digital devices such as tablets, phones and computers.



Mining Games Team



Aero Team

Student Group Highlights

The **USask Aero Design Team** landed its best-ever placement at the 2019 SAE Aero Design East competition, finishing seventh overall against nearly 50 international teams competing in Fort Worth, Texas. In 2020, the team finished eighth overall.

The **Huskie Formula Racing FSAE Team** finished 34th overall in 2019 at the Formula SAE event in Lincoln, Nebraska, earning a fourth-place finish in the Business Presentation event and completing the endurance test for the second year in a row.

The **USask Sled Dogs 1/4 Scale Tractor Team** finished seventh out of 24 teams at the 2019 American Society of Agricultural and Biological Engineers (ASABE) student design competition and in 2018 it finished ninth out of 30 teams.

The **USask Canadian Mining Games Team** excelled in 2019, competing against 11 other teams across Canada, with six first-place finishes and one second-place finish out of 25 events. The team also won the Spirit Award, knocking out Montreal Polytechnique which had held the award for five years. 

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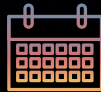
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