

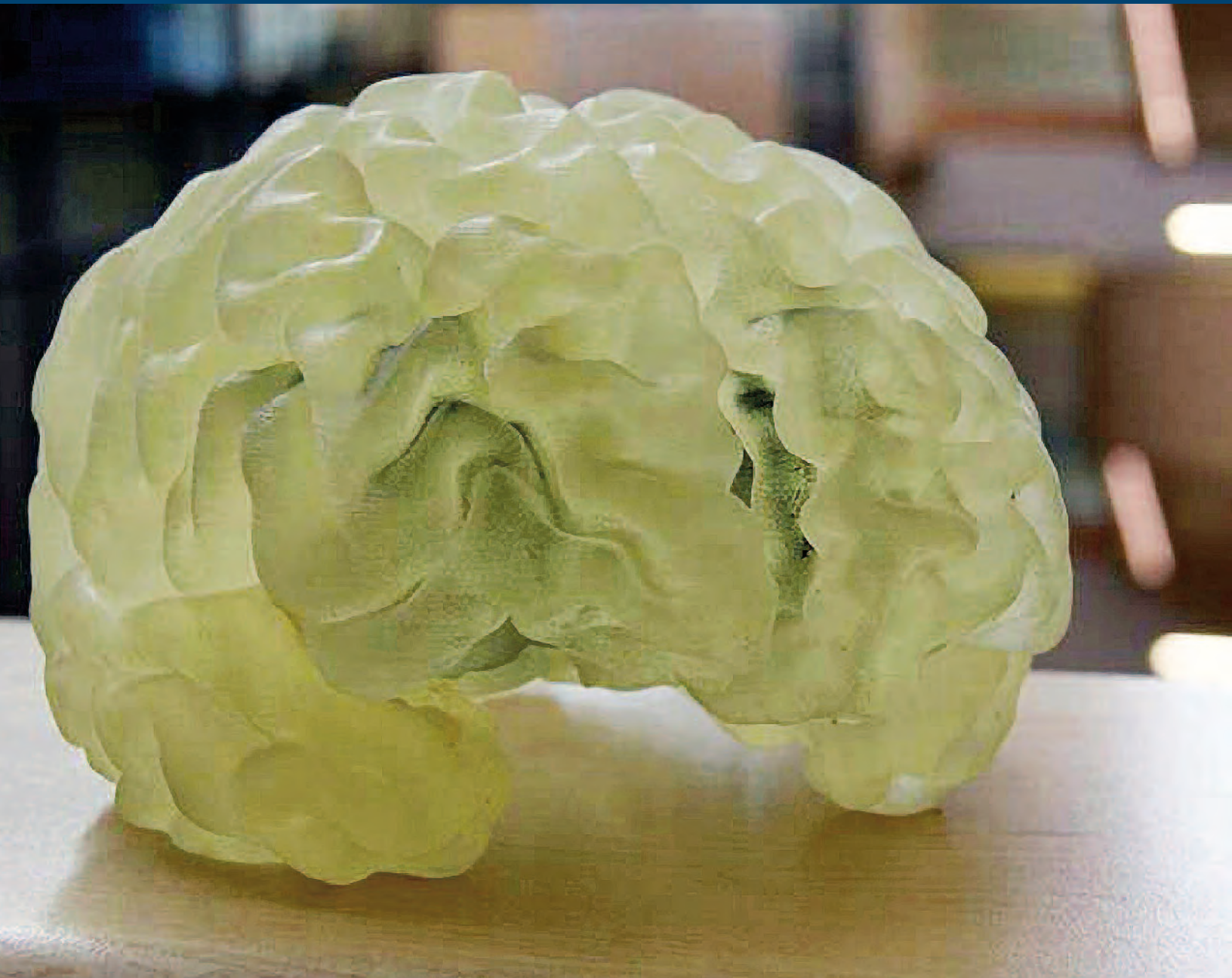
THE PROFESSIONAL



# EDGE

ISSUE 165

NOVEMBER / DECEMBER 2016



Medicine and the Professions

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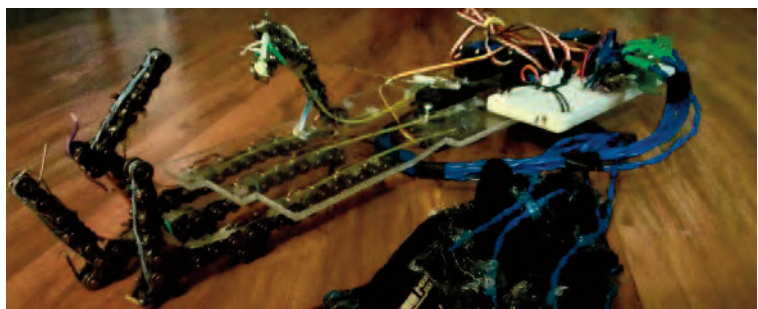


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# President's Message



APEGS President Tara Zrymiak, P.Eng., FEC (centre) at the Engineers Nova Scotia AGM with incoming President Chris Zinck, P.Eng. (left) and outgoing President Bob MacDonald, P.Eng. (right)

John Ralston Saul said,  
“Engineers have done more to improve the health and quality of life of all residents of the earth than all of the medical advances combined, most of which are also engineering achievements.”

I must admit that I was a little bit stumped when I started to compose the message for this medicine-themed edition. When I started to think about it though, I realized that I have seen numerous instances where our professions have collaborated with medical professions to the benefit of all involved.

The more obvious engineering contributions to medicine can be seen in the advancements of robotic prosthetics or mobility aids and in the design and construction of specialized hospital buildings and laboratories. However, there are many others that are not so obvious, including nuclear engineering for magnetic resonance imaging and computer and electrical engineering to develop artificial neural networks, physiological system modelling and other medical instrumentation, to name a few.

Last year I was fortunate to attend the prestigious Ernest C. Manning Innovation Awards dinner in Saskatoon. The level of accomplishment and genius displayed by the winners of these awards was awe-inspiring. The principal award was given to the team of Dr. Mark Torchia and Richard Tyc, P.Eng. for the development of the NeuroBlate® System – a laser-probe inserted into the brain through a small incision in the skull to heat and kill tumour cells. The minimally invasive procedure is conducted in an MRI machine, enabling surgeons to plan, steer and adjust the laser continuously as it is delivered, which increases precision in treating the cancer lesion and avoids damaging surrounding healthy brain tissue.

This allows treatment of tumours and lesions previously considered inoperable by removing the tumour from the inside out. The patient got off the table and walked away minutes after the successful treatment.

This is a remarkable example of a partnership between a medical doctor and an engineer. Both men said that they couldn't have created this great innovation without the other. Tyc said that the use of their procedure to make a difference on a patient was the biggest moment in his career as an engineer.

You can see more about this wonderful innovation at <http://www.manningawards.ca/en/awards/winners/2015/mark-torchia-and-richard-tyc>.

There are many other situations where engineers are making contributions in the field of medicine. The current president of APEGA, Steve Hrudehy, P.Eng., FEC, FCAE, FSRA spent 20 years in the Faculty of Medicine. The recently retired Chair of the APEGA Board of Examiners, Dr. Gary Faulkner Ph.D., P.Eng. founded the biomedical mechanical engineering program at U of A and serves as research, innovation and technology director for Alberta Health Services.

In the Mechanical Engineering Department at the University of Saskatchewan, Associate Professor J.D. Johnston B.Sc., M.Sc., Ph.D., P.Eng. focuses his research on orthopaedic biomechanics and



**At APEGBC AGM: left to right - incoming APEGBC President Bob Stewart, P.Eng., APEGBC President Tara Zrymiak, P.Eng., FEC, outgoing APEGBC President Dr. Michael Wrinch, P.Eng., FEC, FGC (Hon.)**



**At Engineers Geoscientists Manitoba AGM: left to right - incoming Engineers Geoscientists Manitoba President Lindsay Melvin, P.Eng., FEC, APEGBC President Tara Zrymiak, P.Eng., FEC, outgoing Engineers Geoscientists Manitoba President Lesley McFarlane, P.Eng.**

musculoskeletal medical imaging to aid in the treatment of osteoarthritis and osteoporosis. Professor Daniel Chen, Ph.D., P.Eng. is the leader of the Tissue Engineering Research Group with a long-term research goal of developing advanced technologies to produce various scaffold-guided tissue or organ substitutes. The contributions of engineers in the field of medicine are significant and beneficial for society.

Over the last few months I have had the pleasure to represent APEGS at many events around the country. In September I attended the Engineers Nova Scotia Annual Meeting in Halifax, where we were treated to a wonderful lobster dinner with the large group of out-of-town guests. Discussions during the event ranged from design for resilience in the face of climate change and effective communication and cultural competence to accreditation, mobility and national standards.

I then spent four days in Ottawa attending a series of meetings in conjunction with the Engineers Canada board meeting. I was pleased to represent the presidents' group at

the first meeting of the new Linkages Committee. I am confident that the work this group is doing will strengthen the communication and co-operation between Engineers Canada and its owners, the constituent associations, with emphasis on the fact that success needs to be determined by the owners. Some of the biggest topics at the other meetings included developing the improved strategic planning process for Engineers Canada and progress on transformation of the accreditation system.

In October, I attended the APEGBC Annual Meeting in Victoria. British Columbia has many passionate and engaged members. The association is very active in many areas as shown by their new Operational Quality Management program and their accredited employer member-in-training program. They have also done impressive work on an online tool for competency-based assessment and alternatives to Canadian experience.

After that, I was off to Winnipeg where we were warmly welcomed at the Engineers Geoscientists Manitoba Annual Meeting. This group presented many bylaw changes at their business session and reported that they are planning a full bylaw rewrite in the near future.

As we approach the end of the year, I hope you have all submitted your APEGS membership renewal, complete with Continuing Professional Development credits for the year. If you haven't yet had a chance to check out the APEGS CPD Roadshow travelling around the province, take a look on the Events listing on the website to see when it will be in a conference room near you!

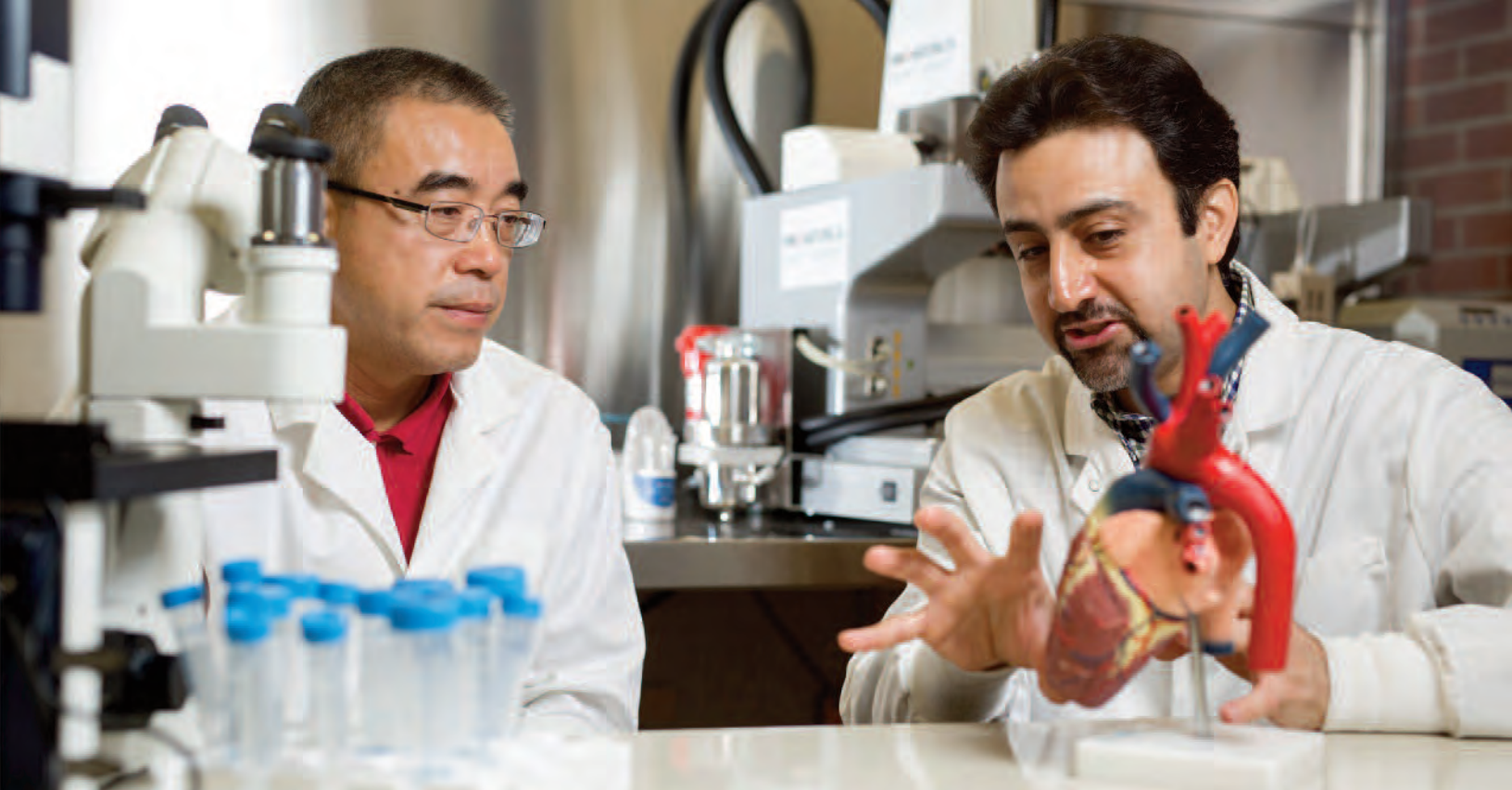
I wish you all a Merry Christmas and happy holiday season.

## Check us out online!



The *e-Edge* delivers all the content of the print edition to your smartphone, tablet or desktop.

www.apegs.ca/e-edge



University of Saskatchewan graduate student Mohammad Izadifar (right) with Professor Daniel Chen, P.Eng.

## THE BODY MECHANICAL: A Look Inside Biomedical Engineering at the U of S

BY MARTIN CHARLTON COMMUNICATIONS

**A** runner might think twice about going for that morning jog if he knew this was the day the impact on his joints would lead to a stress fracture or a major surgery.

How would your life change if you could predict the exact time or movement that would cause a broken bone or an eventual joint replacement like a hip or a knee? Is your bone density strong enough for rigorous exercise?

Finding solutions to these questions and more is part of the daily learning experience within the University of Saskatchewan's College of Engineering biomedical engineering program.

### **A Continually Evolving Machine**

In its simplest form, biomedical engineering sees students apply engineering sciences to find solutions to specific problems in medicine, veterinary medicine and other related fields.

"The human body is this weird machine that keeps changing on us, and every time we think we find a solution

it'll work for a few years and then the body will reject it," explained J.D. Johnston, a professor with the College of Engineering. "I find it fascinating that it's a continually evolving machine. How can we try to fix it?"

The biomedical engineering program currently houses approximately 60 students, all of whom are seeking paperwork for a postgraduate diploma or degree (P.G.D), a Master of Engineering (M.Eng.), a Master of Science (M.Sc.) or a Doctor of Philosophy (Ph.D).

Johnston spent three years as a biomedical researcher at the Institute of Orthopedic Research and Education in Houston, Texas between his M.Sc. and Ph.D. He joined the U of S faculty in 2008 after he studied at the University of New Brunswick and at Queen's University.

He noted the biomedical program at the U of S – with dominant areas of research focused on biomechanics and biomedical imaging—is "on the rise" when compared with other schools across the country. He said that's mainly because of the support from the university when it comes to some of the research being conducted on site.

Of note, current Ph.D student Dena Burnett is studying the

connection between bone density and osteoarthritis pain in the knee. She has learned that people living with osteoarthritis have approximately 30 per cent lower bone density in the knee than those with less pain.

Causes of osteoarthritis, the wear and tear of joints, are unknown. Treatments are limited to painkillers and surgical knee replacements in the most severe cases. And with people taking on various implants to augment their bodies, Burnett is one of a handful of students within the biomedical engineering program studying to make implants better.

“It’s a fascinating study and Dena is shifting the ideas people had about this disease,” Johnston said. “It does help to inform surgeons on when they should be doing these implants.”

The majority of implants used in replacement surgeries for hips and knees are made of metal. According to Daniel Chen, a biomedical engineering professor at the U of S, the human body doesn’t take kindly to metal implants, which is why he and some of his students are researching means of using biomaterials instead of metal to make joints or cartilage. As well, they’re using engineering methods to produce artificial cartilage from biomaterials to replace damaged cartilage.

### Shining A Bright Light on Research

When your campus is home to the Canadian Light Source, the only synchrotron technology in the country, you are afforded some learning luxuries. Construction of the facility – estimated to occupy the same land space as a football field - was completed in 2004.

Students, both high school and from the university level, as well as scientists and collaborators from various realms, have benefited from the state-of-the-art technology in Saskatoon for more than a decade.

The Canadian Light Source has transcended conventional learning in various areas at the U of S, especially within the biomedical engineering program. Medical researchers have utilized the beams to study everything from cell identification within tissues, skeletal remains from centuries ago and dinosaur bones from even farther back in history. Enhancement of imaging has been magnified down to the atomic level.

“The CLS certainly has addressed some interesting questions that a lot of people have struggled with for many years,” Johnston noted.

For example, Johnston explained when people get degeneration of cartilage that their bone becomes “weird.” Some thought mechanical properties in the bone were higher, while others thought it was lower. Under closer examination using the synchrotron, research

showed that the bone you get with that disease not only degraded its mechanical properties but had lost more minerals. It almost became a coarse and brittle material that other imaging tools did not show.

“You were able to receive this beautiful 3-D structure through the CLS and it would tell you exactly what that structure was composed of, while other means were just too coarse to do that,” Johnston said.

Professor Chen explained that students have greatly intensified their research, thanks to the capabilities of the synchrotron and its ability to magnify images to the atomic and cellular levels.

The CLS has drawn a crowd since its completion in 2004. Researchers, especially anatomists, from across Europe and the United States have utilized this technology for their studies.

“We are extremely fortunate to have Canadian Light Source on our campus,” Chen said. “A lot of the research we do in biomedical engineering becomes unique because of this tool. This is an incredibly powerful tool that we can use.”

In the past, studies have included the use of infrared microscopy to identify the living conditions inside individual cells from tissue associated with a potentially cancerous disease. As well, the CLS’s extreme X-ray capabilities aided in an investigation into the deaths of people buried in the 1700s.

“Researchers are dealing with questions like, ‘What makes a cell change?’ Or, ‘Why does bone evolve in this manner?’” Johnston said. “And then others will get involved with that research to do mechanical tests or help with animal models.”

### The Mechanics of Animals

When it comes to animal models, the U of S is one of the few schools in Canada that is home to a veterinary research facility – the Western College of Veterinary Medicine – where students are given the opportunity to test hypotheses on animals before they introduce it to humans.

Biomedical engineering students have taken advantage of this facility to aid in their research.

Rats and mice are commonly used in medical research and that’s the case with many studies at the U of S. Current testing by students sees rats simulating human movements





To learn more about the biomedical applications of the Canadian Light Source synchrotron, check out the video at [www.apegs.ca/e-Edge](http://www.apegs.ca/e-Edge)

**Daniel Chen, P.Eng., professor of biomedical engineering, University of Saskatchewan**

like walking or running to see how their bones and joints respond or evolve.

For example, Dustin Eichhorn is a biomedical engineering student researching toe tip necrosis syndrome in cattle, which has long been a mystery to cattlemen. His hypothesis is that excessive repetitive stress leads to breakdown of the hoof, which leads to this disease. Eichhorn created a biomechanical model of this disease using claws which he subjects to repetitive stress. He then images the hoof to track its degradation.

This experience gave him the understanding of how to help researchers from human medicine and anatomy for their research needs related to fatigue loading in animal models.

### **Robotics**

Biomedical engineering research done in conjunction with the Western College of Veterinary Medicine will last well into the future. But will robots factor into some studies? The future is wide open, according to Johnston.

“This is a very rapidly evolving field,” he said. “With all of

this biotechnical stuff and this man-and-machine talk, it has become very fascinating.”

“We’re hearing more of how man and machine are these two separate entities, yet some (scientists) see it more as a continuum. And there’s more talk about biochips in humans, so you never know what we might see down the road.”

Regardless, Chen is intrigued with his students’ work with technology that produces tissue made from biomaterials for transplant purposes. There’s an incredible amount of improvement needed in the small area of joint replacement.

“For me, I see (biomedical engineering) as an area that is very exciting, especially when we look to the future,” he said. “There is still a lot of opportunity to learn.”



## THE ENGINEERED HOSPITAL:

# Infrastructure, technology, machinery and systems

BY MARTIN CHARLTON COMMUNICATIONS

**E**ngineering and medicine may be separate on college campuses but they are deeply intertwined in everyday life. Engineering has touched almost everything in hospitals, from the design of the buildings to the equipment used to save lives.

“Think of all the machines that surround someone in the ICU - how they interact, when they set off alarms, even the

user interface design. All of this was created by an engineer,” says Sonia Vanderby, Engineer-in-Training and adjunct professor with a joint appointment in mechanical engineering and medical imaging at the University of Saskatchewan.

There’s also the work Vanderby does as an industrial engineer to consider.

“How do we schedule physicians and nurses and patients in a way that allows us to keep costs down and still meet patient needs?”

There are engineered machines and systems for cooking and cleaning, lab testing, artificial joints and prosthetics. Engineering and medicine go hand in hand, and Vanderby has a unique view of how they fit.

Her joint appointment in mechanical engineering and medical imaging is a rarity. It hasn’t been done before at the U of S and she thinks it may also be unique to other universities in Canada.

“It gave me the opportunity to really bring engineering into my research in medicine and bring medical topics and focus into my engineering role - in everything from talking to colleagues, to examples I’m using when teaching classes.”

Check out an award-winning engineering project at St. Paul's on our online edition [www.apegs.ca/e-Edge](http://www.apegs.ca/e-Edge)



### Give and Take

Engineers bring analytical and technical skills to medicine that are sometimes lacking in that discipline. Doctors often see problems, but they don't know to solve them. Engineers know how to collect data, build models and solve equations, says Vanderby. That's where engineers can have the biggest impact.

"Doctors can see that an artificial limb doesn't respond properly but they can't solve it. They have these real-world problems that they don't have the skills to solve."

The challenge of placing engineers in medicine is that people are unpredictable. Vanderby says this lack of predictability forces engineers in medicine to be creative.

"If I'm designing a combine, a car or a building, I can predict exactly how it's going to behave. You know how materials will stack up, how a spreader will spray, how a hydraulic hose will work. But when it comes to patients, nothing is predictable. Someone is not going to step the exact same way every time."

### A Missing Piece

Engineers have played an integral role in hospital settings for decades. Vanderby says that before the 1980s industrial engineers were hired by hospitals in the research department to optimize systems but budget cuts led to the elimination of engineers from the staff of many hospitals.

"If you cut doctors, that makes front page news. But if you cut the behind the scenes, it doesn't. You don't see them as easily but those behind-the-scenes roles reduce patient wait times."

The tide is turning back, says Vanderby. Some hospitals in larger centres like Toronto are hiring back those departments as are organizations like Cancer Care Ontario. "The engineering capacity is being rebuilt. It's a work-in-progress. As we prove we can help solve problems, the perceived value goes up."

"Health care is a highly political sector as well. When it comes to nurses versus engineers, it takes brave hospital administrators to take that risk and side with the engineers."

There are technologists working directly in hospitals - calibrating, installing and repairing machinery - but Aubree Worobetz, major gifts officer at St. Paul's Hospital Foundation, says she sees a disconnect between engineers and hospitals.

"A lot of the work engineers do for hospitals is done through universities, through research, through labs," says Worobetz, who holds a Bachelor of Science degree in biological engineering and a certificate of professional communications from the Ron and Jane Graham School of Professional Development at the U of S.

"There's so much engineering within the building but there aren't engineers in the building itself."

### Engineering Solutions

Worobetz says her training allows her to view the hospital through an engineering lens. She understands and appreciates the science she sees during her everyday work. St. Paul's Hospital Foundation is currently fundraising to purchase an AngioJet Ultra Thrombectomy System which breaks up blood clots in the veins and arteries. The project hits home for Worobetz, who did her fourth-year design project on a biodegradable stent for the carotid artery.

Her project tackled the problem from a biological and chemical angle while the AngioJet uses a mechanical, physical solution. Both solutions were developed in labs away from hospital settings.

While much of this type of off-site research and development is hidden from the public view, Worobetz says that's starting to change.

"It's definitely becoming more in the public eye and people are starting to realize the role engineering plays in health care."

Vanderby, too, sees a shift in how health care is seen in industrial engineering, as well as other fields.

"It's a realm of abundant possibilities where engineering can be applied to help patients, providers, the system, the infrastructure - everything!" she says. "There's so many opportunities, and there's so many problems that need to be solved. We're not going to run out of work."



## PARTNERS IN HEALING:

# Student group applies engineering to solve real-world health issues

BY MARTIN CHARLTON COMMUNICATIONS

If there is one thing that engineers love to do, it's solve problems. SaskInvent is a University of Saskatchewan student group that came about because its founder saw problems that needed to be solved, says current president Brandon Thompson.

"There are student groups for social issues, volunteer groups, but no groups that would build stuff to help people. We seek out problems in society and design or build something to solve those problems," says Thompson, who is in his fifth year of civil engineering.

While the group is interdisciplinary, Thompson says there tend to be more engineers involved than other disciplines. The club's founder, Devon Bradburn, was in mechanical engineering, and they have their meetings in the Engineering Building.

"Engineers are the brute force, but I hope it will turn into something that every college is talking about and knows about," Thompson says.

### Unique Projects

All the projects they tackle are unique. More often than not, they start with a request for help. For their page turn device project, a woman came to them with her problem: She wants to read physical books, but has multiple sclerosis and can't flip the pages.

Other projects take longer to come together, like their optogenetics research project, which aims to treat epileptic seizures using bio-luminescent light. That project is into its third year which is a challenge for a student group where graduations make continuity an issue.

Faculty members oversee the projects, both to help with continuity and as resources for the students. Richard Retzlaff, P.Eng., an assistant professor of mechanical engineering, is

Watch a video of SaskInvent's prosthetics testing platform on the e-Edge at [www.apegs.ca/e-Edge](http://www.apegs.ca/e-Edge)



### 3-D Printed Prosthetics for Children

Create low-cost, 3D printed prosthetic hands for children with birth defects that prevent the growth of fingers.

### TASET

(Total Audio Sensory Experience Translator)

Design a system that will translate music into tactile sensory experiences for people with acquired profound hearing loss.

### Optogenetics Research

Design a real-time treatment of epileptic seizures using bio-luminescent light.

CURRENT PROJECTS

helping with the page turn device. Dr. Sean Maw, P. Eng. and Jerry G. Huff Chair in Innovative Teaching and associate professor at the Ron and Jane Graham School of Professional Development, is helping with TASET (Total Audio Sensory Experience Translator), a system that will translate music into tactile sensations for people with hearing loss.

For the optogenetics research, they have help from Dr. John Howland, a professor in the department of physiology who specializes in behavioural neuroscience. Dr. Ivar Mendez, faculty member in neurosurgery, helped and advised with one of their completed projects: 3-D printed surgical brain models, which Mendez uses in his research on Parkinson's disease.

SaskInvent is currently working on five projects. For their newest project, the man who requested their help got into a car accident over the summer and is currently in rehab to heal the tendons in his wrist. He's requested SaskInvent's help to build him a better rehab device -- one with more functions than the device he's currently using.

Research plays a big part in making any of the projects successful. For the rehab project, they need to find out if there are already products like it out there and if it's even feasible.

"The people who are interested in the project don't have too much background in tendons and arms, so we will have to look elsewhere for help. That's the cool thing about being a diverse university group - we can look elsewhere; it's not just an engineering group."

Which discipline takes on a leading role within the group depends on the project. The optogenetics research project is driven by the members on the medicine side with engineering students playing a supporting role but the TASET project is driven by engineers.

### **Giving Back to Students**

The group was founded in 2014. Thompson would like to see SaskInvent grow into a well-known entity that students will be proud to put on their resumé and employers will recognize.

"The students are putting so much time into the projects. I want SaskInvent to give something back to them."

He's hoping to arrange subsidized costs for events on campus or to send SaskInvent members to workshops or conferences.

There are no goals for how many projects they want to get done. There are no hard and fast rules for picking projects, either. They choose projects based on their interests and people's needs.

If you have projects in mind that might interest the students at SaskInvent, they're always open to hearing new ideas. Visit their website at [saskinvent.ca](http://saskinvent.ca) for more information.



### **Rehabilitation Hand Device**

Improve the current hand rehabilitation devices to allow individual finger therapy, as opposed to the current method where all fingers are adjusted simultaneously regardless of the individual finger's progress.



### **Page Turner Device**

Develop an assistive device to turn the pages of a book for a woman with multiple sclerosis.

CURRENT PROJECTS

# Member Profile



This month *The Professional Edge* chats with Ralf Maxeiner, P.Geo., a Precambrian research geologist with the Saskatchewan Geological Survey.

## Tell us about your personal and professional background.

I was born and raised in Germany – or rather West Germany, as it was known at the time. After high school, I spent a year in Canada with an organization called Frontiers Foundation. Its focus was doing charitable work for First Nations. We moved around quite a bit, building houses on reserves across the country. Through that experience, I basically fell in love with the place.

## What was it that appealed to you so much about Canada?

I think many Germans grow up with an idyllic view of Canada as a place of vast, unspoiled wilderness. In my case at least, my experience matched the ideal. Unfortunately I couldn't stay. I had to return to do my compulsory military service and to take my undergrad studies in Germany.

## Why did you choose to go into geoscience?

I liked rocks but I didn't know that much about them at first. I went into the field because it matched my other interests – I liked the idea of working outside and I thought geology would be a field that would help me find a job in Canada.

My girlfriend and I finally moved here in 1990 when I started my graduate studies at the University of Regina. We got married in the fall of that year here in Regina.

## What was your biggest challenge studying in Canada?

Language was a bit of a barrier but not much of one because, like most Germans, I had studied English since grade 5. Money was always tight of course being on a student budget and having arrived with only two suitcases each.

## What was your first job after college?

My current one! My master's thesis was funded in part by the Saskatchewan Geological Survey so right out of university I was able to get contract work with them that then led to a permanent job with the survey.

## What do you feel was your single greatest accomplishment as an geoscientist?

A big part of my job is working with geology students every summer. Every year, three to five students come up north with us and help with mapping. The greatest satisfaction in my career has been to be able to see so many of these kids grow up, become skilled geologists in their own right and then move on to greater things.

## What are your interests outside of work?

There are a few things that take up my time. We live on an acreage so home improvement is a constant part of our lives – we always seem to be working on something. I also enjoy all outdoor activities like horseback riding, hunting and fishing. I love hunting whitetail deer and have instilled that in my boys, who are 19 and 21 now. They prefer bird hunting, so they drag me along from time to time. They've turned the tables on me – I used to teach them about hunting but now they're teaching me.

## Are you involved in any volunteer activities?

I am heavily involved with the Saskatchewan Geological Society – not to be confused with the Geological Survey. The Geological

Society is a non-profit organization of geoscientists and one of its main goals is to promote earth sciences. I've been president twice and been on the executive for about 10 years in the last 25. We've undertaken several interesting projects. One of the more prominent ones was the making of the Geological Highway Map for the province; it's a regular highway map with the geology as a backdrop and a lot of other really interesting geological information. For the last two years, we've produced the Geological Calendar as another tool to bring awareness to the awesome geoscience we have available to us in Saskatchewan.

#### **What is your favourite vacation spot?**

We enjoy both hot holidays like Mexico or Cuba or ski vacations in places like Fernie, BC. Of course, we go back to Germany to visit family but we also try to work in visits to other European cities. We recently went to Rome and on our next trip we plan on hitting Prague.

#### **What is your favourite book?**

Aside from some of the German authors I grew up with, like Günter Grass, my all-time favourite book is *Lord of the*

*Flies*. I also quite liked *The Hunger Games* novels. I read them a few years back while I was working in the wilderness which provided an extra dimension of realism to them.

#### **Who has had the greatest influence on your life and career?**

For my career, Tom Sibbald, P.Geol. who was the co-supervisor of my master's thesis. He proposed the thesis project and secured the funding for it and later hired me on with the Survey. He's retired now. He is a very bright geologist who was not only an important career mentor for me but also became a very good friend. I really owe him a lot in regards to my career.

Aside from my parents (I'm sure everyone says that), my greatest influence on my life in general has been my wife. She is German like me. She took the leap and came with me to Canada in 1990 and we married here. She found a job and helped pay for my education here in Canada. Without her support, that major move wouldn't have happened.

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## Something to Brag About?

### ***The Professional Edge* is all about you!**

Our annual **Profiles in Achievement** issue will profile Saskatchewan-based engineering and geoscience companies and projects.

**If you want your company or project profiled, or to recommend one, let us know.**

#### **Please contact:**

Professional Edge Editor, Lyle Hewitt  
[lyle@martincharlton.ca](mailto:lyle@martincharlton.ca)





### CPD Reporting and You: Are You a Negative Statistic?

BY ALLISON HILLMER, P.ENG AND SEBASTIAN WALROND, P.ENG., MEMBERS OF THE APEGS PROFESSIONAL DEVELOPMENT COMMITTEE

Over the past year, many of you may have been wondering about APEG'S increased focus on Continuing Professional Development (CPD) credit reporting. Why all the fuss and what has changed that makes reporting CPD now crucial for us in Saskatchewan?

First, it is important to note that nine of the 14 engineering and geoscience regulatory bodies nationally have already implemented

mandatory reporting for their members, including in Alberta (APEGA) and Manitoba (Engineers and Geoscientists Manitoba). This national trend is important for us as it may affect future mobility of our members with other provinces and territories.

Second, a move to mandatory reporting may be required to:

- prevent the loss of APEGS's self-regulation through governmental intervention and
- ensure transparency and accountability in the regulation of our professional community to maintain the public's confidence.

Third, we should recognize that there is no pride in being one of the last self-regulating professional associations to adopt mandatory reporting of CPD activities.

In 2015, only 26 per cent of APEGS members had reported any CPD credits. This statistic helps us to understand why the provincial government or the public may become concerned with so few APEGS members reporting their CPD activities.

This is particularly important in the light of events like the Algo Centre Mall incident in Ontario, and others. As the Saskatchewan regulatory body, APEGS currently has no way to prove that its members are maintaining their competence, and thus the urgency behind the push to get members reporting CPD credits.



Question	Answered %	
	Yes	No
Are you aware that all APEGS members are required to complete professional development activities in order to maintain their competence and increase knowledge?	92.54	7.46
Are you aware that APEGS has guidelines and credit benchmarks for professional development activities?	86.12	13.88
Do you currently keep a log or other means for tracking your professional development activity?	71.85	28.15
Do you currently report your professional development credit hours to APEGS?	49.05	50.95

The table above shows the results of the June 2016 electronic CPD survey. It was very encouraging to see a large percentage of the respondents aware of the need for APEGS members to participate in CPD to maintain competency and increase their knowledge. Also, most of the survey respondents were aware of the established CPD activities and credit guidelines that APEGS members may claim.

Somewhat disheartening was that just under half of the survey respondents currently report their CPD credits. The struggle appears to begin with tracking and keeping a log of development activities during the year which leads to issues when it comes to reporting these activities at the end of the year.

Members who do not report CPD credits become a negative statistic for our association and run the risk of not meeting the minimum requirements established under the CPD guidelines. APEGS Executive Committee has set voluntary CPD reporting benchmark targets of 50 per cent for 2016 and 75 per cent for 2017. Even at this rate, there is room for improvement, and we can do better.

In an effort to raise awareness and educate our members on the why and how to report CPD credits, APEGS staff and the Professional Development Committee (PDC) members have been travelling the province with the CPD Roadshow presentation. As of the end of October, the PDC has made seven stops with more to come before year end and continuing throughout 2017. The PDC is also working on a webinar session for 2017.

In concluding this article we ask you as an APEGS member to start reporting your CPD credits. Don't be a negative statistic!



**For more information, contact:**

Shawna Argue, P.Eng., MBA, FEC, FCSSE, FGC (Hon.)  
 director of education and compliance at 306-525-9547,  
 1-800-500-9547 or email [sargue@apegs.ca](mailto:sargue@apegs.ca)

**To schedule a CPD Roadshow presentation, contact:**

Jolene Arthur, B. Sc. (Hon.)  
 APEGS compliance coordinator at 306-525-9547,  
 1-800-500-9547 or email [jarthur@apegs.ca](mailto:jarthur@apegs.ca)

## Fall Professional Development Days

The APEGS Fall Professional Development Days were held November 3-4, 2016 at the Queensbury Convention Centre in Regina. The two-day event offered six different professional development sessions and included keynote speakers at the luncheons on both days.

The Volunteer Appreciation event, also at the Queensbury Convention Centre, on Thursday evening, was attended by over 50 APEGS volunteers. Food and entertainment were enjoyed by all.



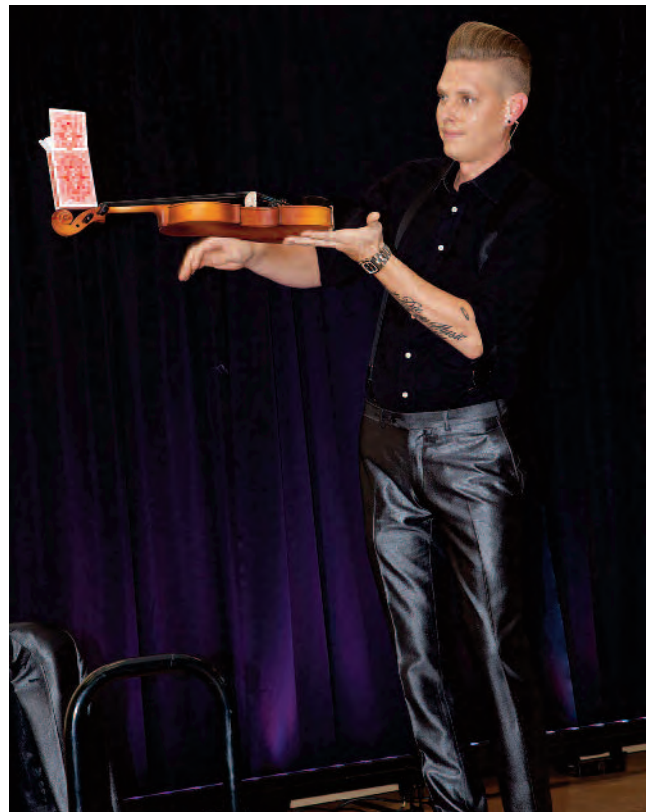
Jennifer Roste, P.Eng. and Monica Tochor, P.Geo.



Jazz trio Carter Powley and Friends provided music through the evening



Ben Boots, P.Eng., FEC and Bob Berry, P.Eng., FEC



Chris Funk the Illusionist provided an hour of amazement

## Council Notes

On October 13, 2016, APEGS Council met with APEGS past presidents and discussed 30 by 30. The 30 by 30 Task Group formed by Council will explore and implement initiatives to achieve the goal of 30 per cent females in the professions by the year 2030.

The APEGS Council held its meeting Friday October 14, 2016 at the Hotel Saskatchewan in Regina. 17 of 19 councillors were present. Council is scheduled to meet next on December 1 and 2, 2016 at the Delta Bessborough in Saskatoon.

### Council received the following presentations and information items:

- Regulatory Bylaws approved by Council have received ministerial approval and have been published in *The Saskatchewan Gazette* as well as *The Professional Edge*. The amendments are now in force and will be put to the membership for final approval at the 2017 annual meeting.
- Activity updates were provided from the constituent society liaisons and the APEGS directors to Engineers Canada and Geoscientists Canada.
- The Children's Discovery Museum Task Group updated Council on activities to date. A final report from the task group is expected at the December or February Council meeting.
- An update was provided on the Continuing Professional Development Roadshow which included an overview of the proposed implementation plan covering the next five years. Emphasis is on awareness and education to increase the voluntary reporting to 50 per cent for 2016 and 75-80 per cent for 2017. Mandatory reporting requires bylaw changes and will be proposed once the levels of voluntary reporting are higher.
- APEGS external legal counsel delivered a presentation on Council's responsibilities to hear reviews as laid out in the Act and Bylaws.

### Council passed motions as follows:

- The Children's Discovery Museum Task Group funding proposal was approved.
- The 30 by 30 Task Group terms of reference were approved with the revised purpose statement, "To support the Engineers Canada initiative and meet the APEGS goal of having 30 per cent of the APEGS membership to be represented by women by the year 2030."
- Sponsorship for the Dream Big 3D and "Girls Night Out"

at the Saskatchewan Science Centre IMAX Theatre.

- Endorsement of the preliminary implementation plan for pursuing mandatory reporting of Continuing Professional Development credits.
- Doug Soveran, P.Eng. as Chair of Academic Review Committee for a two-year term.
- Policy updates to the Professional Practice Exam PPE1.0, the terms of reference for the Professional Practice Exam Committee and the "Alternate Arrangements and Special Accommodations for Writing the Professional Practice Exam – Members' Guideline" were approved.
- Life Membership was approved for the following members:  
Wen Chen, P.Eng.  
Terry P. Blomme, P.Eng.  
Alan M. Childs, P.Eng.  
Kevin J. Gibson, P.Geo.  
David A. Krywchuk, P.Eng.  
Kenneth G. Linnen, P.Eng., FEC  
Mahnaz Missaghi, P.Eng.  
Neil W. Richardson, P.Eng., FEC  
John W. Rittinger, P.Eng.  
Glenn B. Schmuland, P.Eng.  
David N. Watkins, P.Eng.  
Thomas R. Wingrove, P.Eng.  
John D. Wright, P.Eng.
- The "Guideline for Constituent Society Grants and Special Funding", Policy C11.0 was approved as amended.
- The terms of reference for the Image and Identity Board and each committee reporting to the Image and Identity Board were approved as amended.
- Bert Munro, P.Eng., FEC, FGC(Hon) was appointed to the APEGS position on the University of Saskatchewan Senate for the 2017 – 2020 term.
- Margaret Ball, P.Eng., as Vice-Chair of the Investigation Committee for a two-year term.
- Council fixed May 1, 2017 as polling day for the 2017 Council elections and appointed Margaret Anne Hodges, P.Eng., FEC (Chair), Andrew Loken, P.Eng., FEC, FGC(Hon) (Past Executive Committee), Dr. Aaron Phoenix, P.Eng., (Group VI – Chemical, Ceramic and Metallurgical), Kim Junek, P.Eng. (South-West District), John Masich, P.Eng. (North District), and Sandra Foster, P.Geo., FEC (Hon.), FGC (Geoscience North) to the 2017 Nominating Committee.

## Council noted and received the following reports:

- Registrar's reports for May, June, July and August 2016.
- Compliance statistics for June, July, August and September 2016.
- Unaudited financial statements for May, June, July and August 2016.

Committee member appointments: Anh Dinh, P.Eng. to the Academic Review Committee; Dan Bonnet, P.Eng. to the Professional Practice Exam Committee; Kristen Darr, P.Geo. for a second term on the Licensee Admissions Committee; Jennifer Roste, P.Eng., and Jeanette Gellata, P.Eng. to the Professional Edge Committee; Matthew Feige, P.Eng. to the Connection and Involvement Committee; Cam McNaughton, P.Eng. and Leta Brisebois, P.Eng. to the Environment and Sustainability Committee; Jean Nepo Murwanashyaka, P.Eng. and Sean Bayer, P.Eng. to the K-12 Committee; Bob Cooper, P.Eng. as Vice-Chair and Rosemarie Draskovic, P.Eng. and Allison Hillmer, P.Eng. to the Professional Development Committee.

## ANNOUNCEMENT OF APPOINTMENT



### E. Ferguson Earnshaw, P.Eng.

**APEGS Director of Corporate Practice and Compliance**

Bob McDonald, P.Eng., MBA, LL.B., FEC, FGC (Hon.), FCSSE, Executive Director and Registrar, is pleased to announce the appointment of E. Ferguson Earnshaw, P.Eng., as Director of Corporate Practice and Compliance.

Fergus graduated from the University of Regina in 2003 with a Bachelor of Science of Computer Science and again in 2009 with a Bachelor of Applied Science in software systems engineering. He is currently pursuing a Master of Science in industrial systems engineering where he is doing research into robotics applications.

Prior to coming to APEGS Fergus was employed as a senior software engineer at a local consulting firm. Throughout his career he has designed software for a variety of applications such as online video broadcasting, data analytics, m2m communication, data-warehousing, and mobile applications.

Fergus has been active as a volunteer with organizations such as the IEEE, MSI Computer Camps and APEGS where he has served with the Experience Review Committee since 2013 and will now serve as staff resource.

## CALL FOR EXPRESSIONS OF INTEREST

# 2017

## APEGS Annual Meeting and Professional Development Conference

**May 4 - 6, 2017** Hotel Saskatchewan, Regina SK

The APEGS Annual Meeting Planning Committee invites you to submit an expression of interest to do a presentation during the professional development sessions at the **2017 APEGS Annual Meeting and Professional Development Conference on Friday, May 5, 2017 in Regina, SK**. Presentations are scheduled for 45 minutes, allowing for a 40-minute presentation and 5 minutes of questions and answers.

Your expression of interest should contain the title of your presentation and a maximum 100-word description. Submissions should include an engineering or geoscience component or related theme.

Submissions should be forwarded to Chris Wimmer [cwimmer@apegs.ca](mailto:cwimmer@apegs.ca)

For additional information contact Chris Wimmer at (306) 525-9547 or 1-800-500-9547 (North America).

### Terms and Conditions

All submissions will be subject to review by the APEGS Annual Meeting Planning Committee. If selected for the conference, authors are authorizing publication of their submission in the conference program.

## Safety Moment

The Professional Edge is pleased to present this new regular column on workplace safety issues, courtesy of the Saskatchewan Workers' Compensation Board.

### New research shows how CEOs can encourage a company-wide commitment to safety

The Saskatchewan Workers' Compensation Board (WCB) today announced publication of research it funded in the *Journal of Applied Psychology*, entitled "Safety in the C-Suite: How CEOs Influence Organizational Safety Climate and Employee Injuries." The study's authors are Dr. Sean Tucker (University of Regina), Dr. Babatunde Ogunfowora (University of Calgary) and Dayle Ehr (University of Regina).

Based on data collected from 2,714 employees, 1,398 supervisors and 229 in top management teams in 54 small-medium- and large-sized private and public sector organizations, the research findings support a model that shows how CEOs can play an effective role in developing an organizational safety climate in their organizations that actually reduces injuries.

**The stakes are high. Direct and indirect costs for workplace injuries and fatalities cost the Canadian economy approximately \$19 billion annually according to Human Resources and Skills Development Canada. In addition to the human toll, the economic loss can be staggering to a company and those losses impact workers and bottom lines globally.**

The research tests the commonly held leader-centric viewpoint, where the leader at the top is assumed to directly influence front-line employee injuries. Tucker and colleagues found that CEOs in their study actually indirectly influenced workers' experience of injuries by promoting an overarching safety climate in their organization, achieved through the collective learning experiences and efforts of the CEOs' top management team, managers and supervisors.

"Our research is the first to gather hard data to test if and how CEOs influence injuries among front-line workers," said Tucker.

"We found that CEOs have the most direct safety-related influence on their top managers," he continued. "These top managers then role model pro-safety values and behaviours to lower-level managers and supervisors and this in turn cascades down to the front lines. We call this process collective social learning and our data shows that this process works to create an overall safety climate that reduces injuries on the front lines."

The essential ingredient to reduce workplace injuries is a strong safety climate that permeates the organization. The research demonstrates that this is achieved when CEOs, senior managers, managers and supervisors and front-line staff are aligned in their commitment to safety. Beginning with the CEO, and with the active participation of groups spanning the hierarchy, organizations can reduce workplace injuries.

"Aside from the human toll, workplace injuries and deaths take a tremendous toll on a business's bottom line, and this research makes an important contribution to our understanding of how we can improve worker safety and reduce businesses' costs," said Phil Germain, Vice-President of Prevention and Employer Services at the WCB that sponsored the study.

"The researchers collected and analyzed a large amount of hard data to show that reducing worker injuries, which can save businesses literally millions of dollars, comes through a CEO-driven, top-down cascade of directives that promote a pervasive climate of safety at all levels of the organization."

You can read the full paper, including the survey questions they used, here:

<http://psycnet.apa.org/journals/apl/101/9/1228.pdf&productCode=pa>



For more information, visit [www.worksafesask.ca](http://www.worksafesask.ca) or call the Saskatchewan Workers' Compensation Board at 1.800.667.7590.

## Call for Council Nominations



### Nominating Committee

The Nominating Committee, chaired by Past President Margaret Anne Hodges, P.Eng., FEC, is soliciting names for the positions described below. You may contact staff support to the Nominating Committee, Shawna Argue, at [sargue@apegs.ca](mailto:sargue@apegs.ca) to propose names of potential candidates. Shawna may also be reached through the APEGS office in Regina by phone at 306-525-9547 (toll free 1-800-500-9547 North America), or facsimile 306-525-0851.

The Bylaws require the Nominating Committee to nominate, whenever possible, the person holding the office of president-elect for president, and one person for the position of president-elect (typically the person holding the office of vice-president). Ernie Barber, P.Eng., P.Ag. is the current president-elect and Stormy Holmes, P.Eng., FEC is the current vice-president. The Nominating Committee is also required to nominate, whenever possible, at least two persons for vice-president and at least two persons for each vacancy on the Council.

### Submissions of Nominations

Any five members may nominate over their signatures an eligible nominee for any elective office, except that of president. Such nominations shall be in the hands of the registrar at least forty-five days before the election is to take place. To meet this requirement, the nominations must be in the APEGS office no later than 5 p.m., Thursday, March 16, 2017, as the election will take place when ballots are counted on Monday, May 1, 2017, the “polling day.”

### 2017 Vacancies & Terms of Office

#### Officers

- President-Elect – one-year term
- Vice-President – one-year term

#### Group and Electoral District Councillors – to serve a three-year term

- Group VI (Chemical, Ceramic and Metallurgical)
- South-West District
- North District
- Geoscience North

### 2017 Vacancies & Terms of Office

Only members in good standing are eligible for nomination. A person elected to Council may hold office only while a resident of Saskatchewan.

A person nominated for president-elect must have served at least one full year (i.e. from the close of business at one annual meeting to the close of business at the next annual meeting) as a member of APEGS Council prior to the date on which they would assume office as president-elect.

A person nominated as a representative of an electoral group must be classified with the Association in that electoral group. The councillor representing Members-in-Training can complete the term of office after obtaining his or her P.Eng. or P.Geo. status.

For more information, visit:

[www.apegs.ca/Portal/Pages/council-elections](http://www.apegs.ca/Portal/Pages/council-elections)

## For Sale in Victoria BC

### Residential Structural Engineering Firm

*Est. 1990*

Fees: \$1,000,000 / year

Net Income: \$380,000 / year

[structural@shaw.ca](mailto:structural@shaw.ca)

# Reaching Out to the Future – A 30 X 30 Update

BY MARGARET ANNE HODGES, P.ENG.



A year ago when I attended Engineers Nova Scotia's Annual Meeting, an excellent panel discussion regarding women in engineering was part of their CPD program. While there were many take-away facts and figures, the two that stood out related to the influence that family members have on young people planning to pursue engineering as a career.

It's no surprise that women who have chosen engineering have a father, brother or uncle who is already an engineer. That's been obvious for 25 years—it was a topic of discussion when APEGS's first Women in Engineering Committee formed in the early 1990s. At that stage in our history we were just coming together for the first time to ask, "Why are few women entering our profession, when the enrolment in law or medicine is close to parity? What we have in common and why did we choose such a non-traditional path?"

It was a bit of a surprise (as well as very interesting) to hear at this panel discussion that there was a parallel for men: a strong relationship of engineering mentors (again, usually family) influencing the choice of young men to study engineering. This understanding opens new questions. "How do we sustain our profession? How do we increase the number of both men and women attracted to engineering and how do we reach out to those young people with talent who do not have a close role model?"

The 30 by 30 Task Group is very fortunate to have Barbara McKinnon, career education consultant with the Ministry of Education, as a member. She pointed us in the direction of the SCWEA (Saskatchewan Career and Work Education Association) as a forum to bring greater awareness to educators in the school environment about the possibilities and benefits an engineering/geoscience career offers.

Shawna Argue, P.Eng., director of education and compliance and I attended their AGM in North Battleford in October. We had a great response from everyone we spoke to. It was an opportunity to talk about the resources APEGS can offer to students and teachers, from entrance scholarships to curriculum resources (posters with hands-on activities available in English, French, Cree and Dene), from classroom volunteers to, of course, support information regarding 30 x 30.

It was also an opportunity to learn about the challenges facing indigenous kids in the North, an area that both the K to 12 and 30 x 30 Committees want to reach. This is an event in which APEGS will continue to participate. Two weeks later APEGS was at the "See Your Future" career fairs in Regina and Saskatoon, talking to grade 11 and 12 students.

I also ask you, our membership, to think about how you can have a role in a young person’s career decisions since we know that as practising professionals we have an opportunity to encourage girls and boys to consider engineering and geoscience.

With the Christmas and Hanukkah season upon us, check out some of the science-friendly gift ideas:

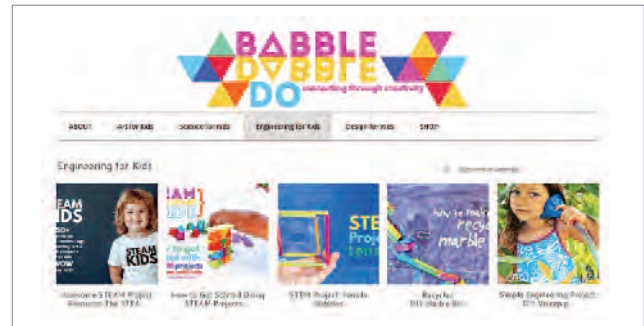
- **Membership in a local science centre or museum:** This is a great way to support local and expose children to a number of different exhibits over the year. Local science centre and museums cater to a number of ages and put on all sorts of events and camps for further learning.
- **3-D puzzles:** Exposes youth to past engineering builds and allows them to build them as well. Puzzles vary in size to challenge many different ages.
- **Lego:** Great gift ideas due to so many different types of sets. There are even Lego Disney castles to build.
- **Goldie Blocks:** I don’t believe this needs explanation.
- **Rosie Revere, Engineer:** We need more exposure to engineering through media or literature. This book encourages reading and engineering. There are also books called Iggy Peck, Architect and Ada Twist, Scientist. <http://www.andreabeaty.com/>
- **Roominate:** This fresh and fun building toy was designed by engineers to help promote mechanical



thinking. Unlike many products which hope to promote science fields, this one relies on genuine creative fun that includes mechanical components.

[www.roominatetoy.com/](http://www.roominatetoy.com/)

- **Computer Engineering Barbie:** It’s a nice change from “Rock Star Barbie” or “Fashion designer Barbie.”
- Also check out: [www.babbledabledo.com/25-steam-projects-for-kids/](http://www.babbledabledo.com/25-steam-projects-for-kids/)



## RCGI HAS MERGED WITH McELHANNEY

We are pleased to expand our environmental service offerings through the acquisition of Remediation Consulting Group Inc. (RCGI)

Visit [www.mcelhanney.com](http://www.mcelhanney.com) to learn more.



McElhanney



## College Corner

BY DONALD BERGSTROM, P.ENG. INTERIM DEAN



Kay Nassar, P.Eng. was recently honoured by the U of S

Since January 2016, I have had the distinct pleasure of serving as the interim dean of the College of Engineering at the University of Saskatchewan. We have had a very productive year and I am pleased to share with you some of our success stories which reflect so positively on our community.

The research taking place in our college drives innovation on a worldwide basis helping to address issues that society faces. Consider Tony Chung, named the first SaskPower Industrial Research Chair in Smart Grid Technologies, who received \$2.2 million to support research that aims to create a reliable power grid for Saskatchewan that integrates renewable energy. Khan Wahid, P.Eng. a researcher in electrical and computer engineering, is working with veterinarians to create an oral endoscopy capsule to get accurate, high-quality images of the guts of horses. This technology could lead to better diagnoses in animals and humans. With support from industry as well as the International Minerals Innovation Institute, Doug Milne, P.Eng., P.Geo., Lisa Feldman, P.Eng. and Paul Hughes, P.Eng. from the Department of Civil, Geological and Environmental Engineering look at rebar strength in underground potash operations. This work could lead to innovations that will help ensure potash mining remains a safe and sustainable part of Saskatchewan's economy.

We are proud to continue this excellence in research by putting forward 21 applications for the Natural Sciences and Engineering Research Council Discovery Grant cycle – the national competition for curiosity-driven research in engineering and science fields.

The college is committed to innovation in engineering education to ensure that our curriculum, and hence our students, continue to exceed industry expectations and public standards. A recent addition was the certificate in professional communications and new mining cluster.

Certainly there is no shortage of success stories from our student body. At our third annual Hard Hat Ceremony, we welcomed over 330 second year engineering students by receiving a hard hat in their disciplines' chosen colour. This event marks a milestone of their academic path as they move from their first year of general studies to their specific program.

Even though our students carry a very heavy course load, they find the time to be engaged in other special accomplishments. Examples include the U of S Innovative Energy Team composed of a number of engineering students who won second place in the Alberta Energy Challenge and the U of S AeroDesign team who placed 11th out of 38 teams from around the world in the Society of Automotive Engineers West competition held in Van Nuys, California.

Our valued alumni continue to reinforce over 100 years of proud tradition for the college. Consider Kay Nasser, P.Eng. outstanding alumnus, professor emeritus and strong supporter of the college and university, who received an honorary Doctor of Science degree at the U of S fall convocation this year. Kay continues to build the college's reputation around the world and we look forward to honouring his achievements as our 41st C.J. Mackenzie Gala of Engineering Excellence Distinguished Lecturer on January 24, 2017.

As part of celebrating those who help build the college's global reputation, we're very excited to have hosted our inaugural Partners of the College: An Evening of Appreciation, with the purpose of recognizing the significant contributions of those who support the work, achievements and success of the college.

There are many more successes from the College of Engineering than I can name here, but the impact of the work and contributions of our faculty, staff, students, alumni and friends, is felt in Saskatchewan and beyond every day.



## Fees Notice

### Fees for 2017 are due on or before December 31, 2016

#### Renewal notices will be mailed soon!

Renewal notices were sent in mid-November. It is the responsibility of members and the official representative for a Certificate of Authorization to make sure contact information is up to date, including your email address.

If you don't receive your dues notice by December 1, 2016, contact APEGS. Fees are due on or before December 31, 2016 regardless of problems with delivery.



#### Check your contact information in your On-line Profile

To check your contact information, log into your On-line Profile by clicking "Login" in the top right corner on the APEGS home page. If you have never used the system before, click on "New password / Forgot password" and follow the instructions.

Other things that can be done in your On-line Profile are: all other fee payments, entering Continuing Professional Excellence (CPE) credits, renewing Permission to Consult, managing your email/mail subscriptions and volunteering for APEGS.

#### What happens if I don't renew?

You would no longer have the privilege of practising within Saskatchewan or on properties or facilities located in Saskatchewan. Use of title in Saskatchewan is also a privilege of membership.

Members who do not retain their membership in APEGS and/or another Canadian association/ordre will lose coverage under the National Secondary Professional Liability Insurance Program. Also, failure to maintain your

membership will result in ineligibility for benefits under the group life insurance program offered through Manulife and Engineers Canada if you have subscribed to this insurance.

#### What if I am not working in Saskatchewan?

Members who are retired or not working (at anything) in Saskatchewan can retain membership and may be eligible for a waiver of the fees for the annual licence. More information can be obtained from the documentation accompanying the dues notice or from the APEGS office.

#### What if my membership ceases and I need to reinstate?

Memberships that have ceased are subject to a 15 per cent fee to reinstate in the same calendar year. Members who notify the APEGS office in writing of their intent to resign their membership on or before January 31, 2016 may reinstate their membership and licence during the calendar year without the payment of a reinstatement or application fee. The late payment penalty for the holder of a Certificate of Authorization is 15 per cent of the annual fee.

For reinstatement procedures for subsequent calendar years, see the APEGS website under Apply, Reinstatement.

#### Eligibility for Life Membership

Members who are 65 years of age and retired are eligible to apply for Life Membership. An application will come with your renewal notice in mid-November.



# 87<sup>th</sup>

Annual Meeting and Professional Development Conference

## A Celebration of Unity Two Professions Working Together

**May 4-6, 2017**

Hotel Saskatchewan, Regina SK

Registration will open in early 2017

[www.apegs.ca](http://www.apegs.ca)

### **Thursday May 4**

Evening Welcome Event

### **Friday May 5**

Breakfast Keynote  
Professional Development Streams  
Professional Development Luncheon  
Luncheon Keynote  
Past Presidents' Dinner  
President's Reception

### **Saturday May 6**

Business Meeting  
Partners Program  
Youth Science Day  
Volunteer Luncheon  
Awards Banquet



**A P E G S**

*Association of Professional Engineers  
& Geoscientists of Saskatchewan*

## Saskatchewan Geological Society presents Geology Wall Calendar



For the second year in a row, the Saskatchewan Geological Society took the initiative to produce the Saskatchewan Geology Calendar. This calendar is designed to educate the general public about Saskatchewan geology and its impact on our lives and prosperity.

**T**he photographs for each month show features spanning the 3.4 billion years of our province’s geological history, from outcrop to microscopic scales, from rocks and minerals to stunning landscapes, from the Precambrian Shield in the north to the Great Plains in the south.

The first four pages of the wall calendar — entitled “Our History”, “Our People”, “Our Resources”, and “Our Landscape” — serve as an introduction to the geoscience of the province. “Our History” highlights the geological time scale with examples of four Saskatchewan geological events; “Our People” is dedicated to two prominent Saskatchewan geoscientists; “Our Resource” tells the story of potash as the featured 2017 mineral resource; and “Our Landscape” features the spectacular glacial valleys of the southern part of the province.

Photographs were submitted by society members and the general public.

In the 2017 calendar, every month showcases an interesting geological feature from Saskatchewan, along

with both general and detailed explanations, fun facts and “did you know’s”. The month of February, for instance, displays an aerial image of a winter shoreline taken from an unmanned aerial vehicle (UAV). The caption describes how wind and wave action along the shore of a reservoir in southwestern Saskatchewan has created the beach and bluff zone, enhanced by the striking patterns of multiple generations of ice formed over the winter.

August features a close-up of blue cordierite crystals surrounded by white feldspar and grey quartz in an approximately 1800-million-year-old metamorphic rock (gneiss). The picture was taken along the shore of a lake 20 km north of La Ronge. The fun fact about cordierite is that it has been called the “Viking’s Compass” because the Vikings are believed to have made use of its unusual light properties. As the mineral is turned, it changes colour, thus indicating the direction of the sun on overcast days.

October, labelled “Giant Steps and White Mud,” shows the erosional cliff faces of the Whitemud Formation exposed along the Missouri Coteau. The calendar explains how modern-day processes — combined with the action of continental ice sheets — has exposed these strikingly white rocks which were originally deposited over 65 million years ago when dinosaurs roamed Saskatchewan.

The 2017 calendar is available now in Regina at the MacKenzie Art Gallery, the Royal Saskatchewan Museum, the Artful Dodger, the University of Regina bookstore and the APEGS office. In Saskatoon, the calendar is available at the University of Saskatchewan bookstore, the Department of Geological Sciences at the U of S and the McNally Robinson bookstore.

In addition, it is for sale at SGS luncheon talks in Regina and at the SGS website ([www.sgshome.ca](http://www.sgshome.ca)). The calendar retails for \$10, with discounts for orders of more than five copies (5-9 copies for \$8; more than 10 copies for \$6 each). All proceeds benefit educational programs in geoscience offered by the SGS in Saskatchewan.

The Calendar Committee consists of professional geoscientists from industry, academia and government.

The Saskatchewan Geological Society is a non-profit organization with a purpose to increase the understanding of geoscience in Saskatchewan, encourage the study of earth sciences, enhance the practice of professional geoscientists, foster scientific research among our members and promote earth sciences among the general public through educational outreach.

# SAVE THE DATES!

## APEGS Spring Professional Development Days

March 2-3 in Saskatoon

The complete agenda is under construction! The following topics are confirmed:



**Get to the Point!**

2 day  
technical writing course

– back by popular demand –  
this course always sells out!



**Geoscientists Canada  
QP Short Course**

(Full day) – for those members working  
with NI 43-101  
and  
NI 51-10

## MORE TO COME!

Check the APEGS website and watch your email in January 2017 for registration details.

For further information, contact Shawna Argue, P.Eng., MBA, FEC, FCSSE, FGC(Hon.),  
APEGS director of education and compliance [sargue@apegs.ca](mailto:sargue@apegs.ca)

## EIDOS HAS MERGED WITH McELHANNEY

We are pleased to expand our landscape  
architecture and urban design and planning  
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McElhanney

# Engineering and Geoscience Bursaries, Scholarships and Member Grants Available

The Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) is pleased to announce 14 annual bursaries and scholarships to be awarded at the University of Saskatchewan and the University of Regina and member grants to be awarded by APEGS.

## Entrance Bursaries

These bursaries are aimed at encouraging and assisting high school graduates entering the study of engineering or geoscience. These bursaries are particularly aimed at Aboriginal students who are under-represented in the professions.

- Two bursaries of \$3,625 (one for each university) to be applied towards first-year tuition in any field of engineering for a self-identified Aboriginal student.
- Two bursaries of \$2,750 (one for each university) to be applied towards first-year tuition in any field of geoscience for a self-identified Aboriginal student.
- Two bursaries of \$3,625 (one for each university) to be applied towards first-year tuition in any field of engineering for a student of any background.

## Undergraduate Scholarships

These academic performance and community participation-based scholarships are aimed at recognizing leadership and volunteerism among students currently enrolled in engineering or geoscience.

- Six scholarships of \$1,875 (three for each university) for current students of any field of engineering.
- Two scholarships of \$1,875 (one for each university) for current students of any field of geoscience.

## Graduate Students

These merit-based grants are aimed at encouraging existing APEGS members to further their education.

- Grants of \$7,500 (one for each university) for current APEGS members returning for post-graduate studies in fields of engineering, geosciences or an MBA program.



Professional Engineers and Geoscientists

**We See More.**



[www.apegs.ca](http://www.apegs.ca)

For more information, refer to the APEGS website:  
<http://www.apegs.ca/Portal/Pages/Scholarships-Bursaries-Grants>

# News From The Field

## UNIVERSITIES AND RESEARCH

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### US university makes strides with female engineering students

*George Washington University Hatchet* - The number of women earning bachelor's degrees in engineering at George Washington University (GWU) in Washington, D.C., is steadily increasing.

Nationally in the US, an average of 20 per cent of women earn bachelor's degrees in engineering. But GWU's average for women is 42 per cent for engineering degrees.

A university spokeswoman speculated that increased numbers of female faculty may have helped recruitment.

"Having women professors is important because then female students can imagine themselves working in the field," she said. "It becomes possible. Also, the presence of women in higher levels gives women a feeling of belonging to the organization, and the glass ceiling appears higher."

Experts said that the percentage of women graduating with bachelor's degrees in engineering and computer science demonstrate that GW has been successful in recruiting women – something most engineering schools are pushing for but have struggled with.

However, Nasir Memon, a professor of

computer science and engineering at New York University's Tandon School of Engineering, said that female enrolment in these programs is only one part of a larger issue: Engineering schools' professors and administrators must encourage women to stay in engineering programs until they graduate.

"We make sure we have women faculty that are talking to the prospects because one of the most important aspects of recruiting them is making sure the right role models are around," Memon said. "But enrolment is one thing. What is much more challenging is providing that culture, that nurturing culture, that supports women throughout the program so that they stay in the program."

### STEAM team shines light on agriculture

*U of S website* - The University of Saskatchewan STEAM (Science, Technology, Engineering, Arts and Math) team partnered with the Canadian Light Source to raise a grain elevator at the 2016 Nuit Blanche in Saskatoon's Victoria Park during the Oct. 1 weekend.

The STEAM team is a collaborative group of engineering and fine arts students with the goal of bridging the gap between two distinct practices.

Inspired by the theme of food, the STEAM group's creation focused on food production and the transformation of Saskatchewan's farming history. The kinetic sculpture transformed itself throughout the evening. Mirroring the change in agriculture, the grain elevator started with projections of still photographs of pioneering methods of grain farming and ended with a video of the genetic structure of wheat and yeast to represent the advanced technology seen today on Saskatchewan farms. The video of the wheat and yeast were provided by the Canadian Light Source.

The USask STEAM team for this art installation was led by engineering students Lauren Shyluk and Tim Gadzella, and fine art student Dani Dale. Guiding the team was engineering professor Rick Retzlaff, P.Eng. and staff member Liz Kuley, Engineer-in-Training.

Nuit Blanche is an evening arts festival that showcases and celebrates art and culture. This year's theme was "Creative Cuisine as an Agent of Change."

## ENVIRONMENT

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### K+S invests in native grasslands

*miningweekly.com* – K+S Potash Canada has partnered with the Saskatchewan government and Nature Conservancy of Canada to protect a swathe of grassland in Saskatchewan.

The \$1-million project aims to achieve "no net loss" of native



grasslands as a result of the construction of the K+S Legacy mine near Bethune.

In what K+S billed as the largest known industry investment in grassland habitat offset in Saskatchewan's history, K+S undertook to conserve an estimated 402 hectares of high-value grassland to offset the 194 hectares of grasslands that have been impacted by the mine development.

The plan enables Nature Conservancy of Canada to invest K+S funding where it will provide the greatest conservation value possible.

### Mining companies thinking ahead on carbon pricing

*Canadian Mining & Energy* - Carbon pricing is pushing mining leaders to consider renewable energy options as a way of further reducing GHG emissions and stabilizing energy costs.

Among the Canadian mining companies leading carbon reduction and renewables integration are Barrick Gold, IAMGOLD, AurCrest Gold, Goldcorp and TMAC Resources. These companies are investing in renewables and mine electrification to reduce their carbon exposure, stabilize energy costs and boost social licence to operate.

Internationally, emerging carbon policies in key mining jurisdictions including Chile, Argentina and South Africa are also pushing mining leaders into introducing carbon risk into their energy plans for global operations.

### Greening up gold mining

*Canadian Mining & Energy* - Stephen Foley, a professor with a Ph.D. in organic chemistry at the University of Saskatchewan, and his team of Hiwa Salimi and Loghman Moradi took a look three years ago at how the mining industry extracts gold.

Their findings were surprising. The core process in the precious metals mining industry – using cyanide to extract gold – hadn't changed in 125 years.

Mining in Canada is dominated by engineers. However, Foley and his team believed that there could be a place for chemists when revamping the core processes necessary to

extract gold and other precious metals.

Over the years, engineers have struggled with little luck to reduce the environmental impact of the current harmful process. Rather than simply refining the outdated harmful processes of gold extraction in mining, the Saskatchewan team of chemists set out to create an entirely new, environmentally friendly—yet still economically feasible—system.

Their research led to the discovery of the gold-selective properties of concentrated acetic acid when used as a solvent. Diluted acetic acid is essential household vinegar — a seemingly simple fix to large problems in mining. When they added tiny amounts of an acid and an oxidant to their acetic acid, the system successfully acted in seconds.

The team has now turned its attention to gold recycling - the recovery of gold from electronic waste, a process that is also not very environmentally friendly.

### Measuring oil sands emissions from space



*Calgary Herald* - A satellite is measuring emissions from Alberta's oil sands in a pilot project that industry officials believe will show aerospace measurements can be cheaper and safer than testing from the ground.

Imperial Oil Ltd. is working with other major oil sands players on the project, which aims to identify more accurate measurements of so-called fugitive emissions, uncontrolled leaks or releases of gases into the atmosphere.

By having a more accurate method of measurement, oil sands producers say they could test technologies to reduce these emissions and confirm whether they are effective.

Oil and gas companies are required by law to measure these methane and carbon dioxide emissions. Under the current method, companies extend a large hood over the surface of the tailings pond or set it on the mine to capture and measure emissions. They use this data to estimate the pond's or mine's total emissions.

This method is expensive, takes imperfect measurements and poses safety risks to workers who must take the



readings on tailings ponds or near mine openings.

The satellite project uses technology from Quebec-based GHGSat to measure emissions from two tailings ponds and one mine. The satellite, named Claire, launched in June and will remain in orbit for at least a year, travelling above Alberta's oil sands once every couple of weeks.

Industry advocates believe satellite technology could become the industry standard for measuring these emissions, should the pilot project be successful.

## ENERGY

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### Sask. company to start geothermal power project

*Thinkgeoenergy.com* - Canada has been waiting to see a geothermal project succeed in delivering geothermal power.

Now, the Deep Earth Energy Production (DEEP) in Saskatchewan is likely to be the first one. The company plans to start drilling in February 2017 as part of a \$8 million feasibility study. The investment is coming from Regina-based MPM Construction Services. Working plan and final reporting for the project will be conducted by GeothermEx, a Schlumberger company.

The project is expected to require a total investment of \$45 million.

Preliminary results on the project site are promising and suggest that it is a utility-scale project that will be economically and technically viable. For SaskPower, it is an interesting first step to acquire baseload renewable energy power.

Although the plant is expected to produce a total of 10 MW, half of the power produced will be used to run the system.

The long-term plan of DEEP is to build and operate several geothermal power plants using nearby oil and gas wells.

### New technology uses vent gas for power

*Pipeline News* - Last year at the Saskatchewan Oil Show in Weyburn, Black Gold Rush Industries was showing off its enclosed vapour combustor designed for combusting low pressure vent gas. This year, at the Lloydminster Heavy Oil Show, they have another new product in addition to their combustor on display – a power generating system that takes advantage of low pressure vent gas on a well site. It's their latest tool in Black Gold Rush's methane reduction technologies.

The product is called the Rush Power 1000, and the 1,000 indicates the amount of continuous watts it produces.

Using waste gas instead of costlier propane, oil companies can realize significant savings. The company also states that the unit will qualify for carbon credits.

The company says that between the Rush Burner, used to heat oil in the tanks, Rush Power to generate power, and the Rush Combustor, it is now possible to completely eliminate all vent gas on a well site.

### SaskPower blowing wind proposal says proponent



CBC - A proponent of wind energy is taking his frustrations with Saskatchewan's government-owned power company to the Provincial Auditor.

James Glennie, president of SaskWind, is proposing a community-owned wind project near Swift Current.

He says he has spent years trying to get an answer from SaskPower on his proposal.

Glennie said he specifically applied through SaskPower's unsolicited power proposal (UPP) process because his would be the first community-owned wind project in North America.

He said it would cost more up front because capital would be raised through individual shares sold to thousands of community members. But Glennie said it would keep more money in the province in the long term by returning profits to those Saskatchewan-based investors.

Glennie said SaskPower encouraged him to submit a UPP, then told him it would not be appropriate to consider it outside the competitive process.

SaskPower responded that, as part of their mandate to supply the lowest cost power possible, any wind proposals would have to go through a competitive process.

Glennie notes that SaskPower's criteria for unsolicited proposals specifies that they not be those which are being competitively bid on.

Glennie says he wants the auditor to know about his company's experience the next time she reviews SaskPower's process for assessing unsolicited independent power projects.

## MINING

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### **Gensource clears hurdles on path to potash mine**

*Saskatoon StarPhoenix* - The head of a Saskatoon-based junior mining company says it has cleared several important obstacles standing in the way of its plan to enter the potash industry.

Gensource Potash Corp.'s purchasing of mineral extraction leases, signing of a five-year sale agreement and launching a feasibility study all advance its plan to build a 250 000 tonne-per-year potash mine in southern Saskatchewan.

Gensource's business plan is based on its CEO's belief that conventional potash companies have reduced demand for the fertilizer by pricing potential buyers out of the market — a problem he proposes to solve through a "vertical integration" business model.

The company proposes to sell potash extracted from a small solution mine directly to end users around the world. The company's Vanguard site is near Tugaske, north of Moose Jaw.

This summer, Gensource spent \$2.48 million to buy two potash exploration leases for its Vanguard property from Yancoal Canada Resources Co.

The company also signed a renewable five-year agreement that will result in the Chinese company — which is working toward building its own potash mine near Southey — buying 250 000 tonnes of potash per year at market prices.

Gensource hired three consulting and construction companies to complete a feasibility study for its proposed Vanguard mine. That work is expected to be finished in the first quarter of 2017.

Industry experts have questioned plans proposed by Gensource and other junior miners, citing high production costs, a lack of established distribution networks and extremely weak global prices as significant challenges.

Other companies with similar plans have failed to secure financing. In August, Karnalyte Resources Inc.'s plan to start work on a 650 000-tonne-per-year mine near Wynyard this fall was jeopardized after a financing deal worth about \$700 million fell apart.

### **Silver strikes gold**

*Saskatoon StarPhoenix* - Four months after acquiring Saskatchewan's only gold mining company, Silver Standard Resources Inc. is laying plans to look for more of the precious metal on a massive property next to its northern Saskatchewan gold mine.

The Vancouver-based company signed an option agreement with Eagle Plains Resources Ltd. to explore the

84,000-acre Fisher project adjacent to its Seabee gold operation, about 125 kilometres northeast of La Ronge.

Silver Standard completed its friendly takeover of Claude Resources Inc. in May, paying the equivalent of \$450 million for the Saskatoon-based company. The Seabee gold operation entered production in 1992 and consists of two producing mines: The Seabee Gold Mine and the newer Santoy Mine Complex.

## OIL AND GAS

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### **Crown rights sale doubles bonus bid revenue**

*Regina Leader-Post* - The October sale of Crown petroleum and natural gas rights raised \$17 million, effectively doubling the bonus bid revenue for the 2016-17 fiscal year and bringing the total to \$34 million with two sales remaining.

"Saskatchewan's average per-hectare price is the highest among Western Canadian public offerings, indicating sustained interest being shown by the industry in the province's petroleum and natural gas resources," the Ministry of the Economy said in a news release

The Estevan area attracted the most bonus bids in the October sale, with Kindersley a distant second.

The top bidder was Millennium Land Ltd., which spent \$9.8 million, including two exploration licences located west of Estevan for \$6.9 million.

## INFRASTRUCTURE

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### **Highway 16 upgrade complete ahead of schedule**

*Yorkton News Review* - An estimated \$52.4 million Highway 16 project east of Saskatoon that will improve safety and support the economy is targeted to open to traffic one year early.

Funded by the Governments of Canada and Saskatchewan, the project includes the construction of 19.5 km of new twinned highway from east of Saskatoon to west of the Bradwell access road, shifting Highway 16 north of Clavet, and a new CN railway crossing.

Construction began in 2014 and had originally been targeted to be completed in the fall of 2017. Favourable weather and contractor capacity contributed to accelerated progress.



## ASSOCIATION OF CONSULTING ENGINEERING COMPANIES | SK

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of Excellence & Achievement

### 2016 Awards of Distinction

The 2016 Association of Consulting Engineering Companies – SK (ACEC-SK) Awards Reception was held November 15 at TCU Place in Saskatoon. Congratulations to all our worthy recipients.

#### BUILDINGS CATEGORY

### Award of Excellence

#### Stantec

Project: Five Hills Health Region Regional Hospital  
Client/Owner: Five Hills Health Region

#### MUNICIPAL INFRASTRUCTURE AND WATER RESOURCES

### Award of Merit

#### AECOM

Project: Sask. Landing Regional Water System  
Client/Owner: Sask. Landing Regional Water Pipeline Utility (SLRWPU)

#### MUNICIPAL INFRASTRUCTURE AND WATER RESOURCES

### Award of Excellence

#### AECOM

Project: Regina North Pressure Zone  
Client/Owner: City of Regina

#### MUNICIPAL INFRASTRUCTURE AND WATER RESOURCES

### Award of Excellence

#### Associated Engineering(Sask) Ltd.

Project: City of Saskatoon Reservoir and Pump Station Upgrades - Implementing Long Term Water Safety and Security  
Client/Owner: City of Saskatoon

#### NATURAL RESOURCES & ENERGY PRODUCTION RESOURCES

### Award of Merit

#### ENGCOMP

Project: Ammonium Sulphate Plant Expansion  
Client/Owner: AREVA Resources Canada Inc.

### Brian Eckel's Scholarship

**Sarah Keene**, Brian Eckel Memorial Scholarship Award Recipient is a civil engineering student at the University of Saskatchewan

[http://www.acec-sk.ca/awards/scholarship\\_winner/2016\\_recipient.html](http://www.acec-sk.ca/awards/scholarship_winner/2016_recipient.html)



### Lieutenant Governor of Saskatchewan Meritorious

#### ACHIEVEMENT AWARD RECIPIENT

**Ray Machibroda, P. Eng.**, accepting the Lieutenant Governor of Saskatchewan Meritorious Achievement Award on behalf of his father Paul Machibroda P.Eng., P. Geo., FCSCE from The Honourable Vaughn Solomon Schofield, Lieutenant Governor of Saskatchewan, S.O.M., S.V.M.

[http://www.acec-sk.ca/awards/lt\\_gov\\_award/2016\\_recipient.html](http://www.acec-sk.ca/awards/lt_gov_award/2016_recipient.html)

### Mentor Award

**Dave Kent, P.Eng., FEC.**, of Clifton & Associates

[http://www.acec-sk.ca/awards/mentor\\_award/2016\\_recipient.html](http://www.acec-sk.ca/awards/mentor_award/2016_recipient.html)

### Young Professional

**Kyle Cator, P.Eng.**, of Golder Associates Ltd accepts the association's Young Professional Award

[http://www.acec-sk.ca/awards/young\\_professional\\_awards/2016\\_recipient.html](http://www.acec-sk.ca/awards/young_professional_awards/2016_recipient.html)

# News Beyond Our Borders

## New Champlain Bridge a showpiece

*On Site Magazine* - Canada has been home to a variety of megaprojects in recent years. None will be more visually stunning than the new Champlain Bridge (NCB) in Montreal, which will replace the existing Champlain Bridge in 2018.

The existing bridge crosses the St. Lawrence River to connect Verdun and Brossard. It is the centrepiece of a major transportation corridor, supporting an billions in Canada-US trade annually. Some 50 million vehicles of all types cross it each year.

Opened in 1962, the Champlain Bridge is nearly to the end of its usable life after years of heavy use, harsh weather and de-icing salt. Following a pivotal engineering study in 2010, it was decided to completely replace the bridge.

The 3.4 km bridge has a three-corridor design including two, three-lane corridors for vehicles and a two-lane transit corridor. It will also include a multi-use path for pedestrians and cyclists.

Delivery is set for Dec. 1, 2018. The demanding timeline is the biggest challenge with this project. Modular construction practices, including the use of precast concrete and prefabricated steel parts, are essential in meeting these demands. Designers turned to a Canadian precedent – the Confederation Bridge that links P.E.I. and New Brunswick – for ideas, including approaches to designing the foundation. That approach was based on building precast footings on site and moving them by barge to their final locations, guided by GPS.

## Winnipeg in battle against erosion

*The Canadian Press* - Any boat trip along the Red or Assiniboine – Winnipeg's two largest rivers – reveals wet, newly exposed soil and trees with exposed roots leaning over the river. The annual rise and fall of



www.thestar.com

the city's rivers and creeks causes erosion as in any riverfront community.

What exacerbates the problem in Winnipeg is its soil. In most places, it's a heavy, sticky clay gumbo that can fall apart in large chunks.

"Clay is very weak so ... you get these deep-seated failures that we see in quite a few places in the city," says Kendall Thiessen, the city's riverbank management engineer.

Occasionally, a section of riverbank that's on the verge of collapse prompts quick action.

After the flood of 1997, 108 graves at the Elmwood Cemetery had to be moved due to a failing shoreline. About \$1.5 million in public money was spent to rebuild and stabilize the bank – a process completed in 2005.

There are more than 100 kilometres of publicly owned shoreline in the city and almost as much in private hands. City hall estimates the cost of addressing critical and moderate-need publicly owned areas would be about \$200 million. But the budget is far less – only \$1 million is spent in an average year.

## Mass homelessness top concern for BC seismic engineers

*CBC News* - BC builds to some of the highest seismic standards in the world so you might assume the majority of residents would be able to return to their homes after a major earthquake. It turns out it's not quite that simple.

Engineers design buildings today for what they term "life safety" during the main event, which means your building will likely still be standing when the ground stops shaking.

That's the good news, says Perry Adebar, head of UBC's civil engineering department.

"But the code doesn't ensure that a building can be usable. So people will leave the building safely and perhaps never re-enter."

Adebar points to Christchurch, New Zealand, as an example. After that city's 2011 earthquake, teams of engineers inspected 3,000 buildings in the downtown core and yellow- or red-tagged 45 per cent of them because of safety issues. By February 2015, 1,240 of those buildings had been demolished.

This is the scenario that worries BC's engineering and emergency planning communities most. Metro Vancouver has seven times the population of Christchurch and 20 times the density. If the earthquake strikes close enough to the lower mainland, Adebar predicts as many as 100,000 people could be displaced.

It's a looming disaster that, Adebar says, the engineering community is finally beginning to wake to, as colleagues increasingly look for better ways to collaborate, train and understand what resilient design looks like.

But Adebar worries it may not be happening fast enough.

"You might say that the best thing that could happen to our area is a small earthquake that damages a few buildings, doesn't hurt anybody, and everyone will start to realize yes, this is real. This could really happen."

Only then, he says, will we – individuals, scientists, government – be forced to take resiliency seriously.

### **UWaterloo to lead national initiative to manage hazardous waste from mining**

*University of Waterloo* - The Natural Sciences and Engineering Research Council of Canada (NSERC) has awarded \$5.5 million to the University of Waterloo to lead a national team of experts in developing sustainable strategies for dealing with hazardous mine wastes.

While mining contributes billions to Canada's economy and provides employment, resource extraction and processing operations often generate significant environmental liabilities associated with the long-term management of mine wastes and closures. Although modern mining companies are required to provide closure assurance funds to deal with post-closure liability and cleanup, there are more than 10,000 abandoned mines in Canada. Local communities may experience lasting social, economic and environmental impacts.

The multidisciplinary research team from universities and communities across Canada includes geochemists, hydrogeologists and experts in waste-water processing, geotechnical and environmental engineering, nanotechnology, environmental sociology and more.

By anticipating potential environmental problems and planning preventative actions prior to initiating mining operations, environmentally sustainable mining practices will help to alleviate the costs associated with the perpetual treatment of mine wastes and contaminated drainage.

## **TECHNOLOGY CORNER**

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### **Robots perform eye surgery for first time**

*Electronics360* - For the first time, surgeons at the University of Oxford's John Radcliffe Hospital have performed an eye surgery using a robot.

Doctors used the remotely controlled robot to lift a membrane that was 100th of a millimeter thick from the retina at the back of the right eye of the patient.

The Robotic Retinal Dissection Device (R2D2) needs to be incredibly focused and precise since it must operate inside the eye through a single hole that is less than 1-mm in diameter and it needs to go in and out of the eye through this same hole during various steps of the procedure, even though the eye may rotate. The robot, which acts like a mechanical hand, is comprised of seven independent computer-controlled motors that produce movements as precise as 1000th of a millimetre in scale.

The purpose of the robotic eye surgeon is to eliminate unwanted tremors in the surgeon's hand – like the ones that come from a pulse – so that tiny surgical manipulations can be safely carried out within the eye.

The surgeon controlled the robot with a joystick and touchscreen, continually monitoring the robot's progress over the course of the entire procedure.

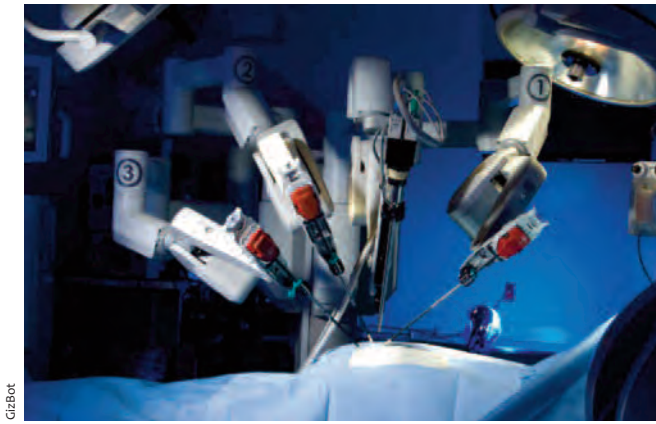
### **What makes surgical robots tick?**

*Electronics360* - In 1985, for the first time, a robot was used to assist in a surgical procedure on a human. A trail-blazing team modified an industrial robot that guided a needle in a brain biopsy procedure. Since then the rate of new technological advancements has done nothing but accelerate.

Today surgical robotics have caused a fundamental shift in the practice of medicine. The market-leading surgical robot, the da Vinci system manufactured by Intuitive Surgical, Inc., provides innovative surgical robotics across cardiac, thoracic, urology, gynecologic, colorectal, pediatric and general surgical disciplines.

The ever-accelerating growth in surgical robotics is guided by many factors.

- Micro-motors that drive the surgical tools grow smaller, more powerful and offer surgeons up to 10 degrees of freedom even while operating in tight spaces.
- Advances in medical imaging now include small high-performance cameras that image three-dimensional, high definition video showing internal organs in natural colour.
- Haptic feedback gives surgeons a tactile sensation to



CiBor

better control the robotic system, and has led to increased acceptance of robotic surgery.

- Patients and surgeons across the board have become more comfortable with the concept of robotic-assisted surgery.

Along with these advances robots, become capable of new functionality and the definition of “robot” has continued to evolve.

### Engineer develops cheaper prosthetic for kids

*Metro Winnipeg* - Matt Gale, A Winnipeg engineer with Northern Bionics, has found a cheaper way to give youth amputees a hand—specifically, a controllable prosthetic that can open and close.

With modern technology, amputees can control prosthetics “myoelectrically,” which basically means the devices react to electric signals in the muscles of a residual limb.

Gale explained it’s an effective technology adult amputees appreciate, but it’s also costly and delicate—making such prostheses impractical and inaccessible for kids who might outgrow them in short order.

“They’re very expensive, tens of thousands of dollars, and not practical... it doesn’t make sense for them to pay that much until they’re a little older,” he said.

Gale works full-time as an engineer specializing in 3-D metal printing with Precision ADM in Winnipeg, but volunteers at the Rehabilitation Centre for Children.

That knowledge prompted him to combine his leading-edge 3-D printing know-how with young patients’ needs to create a prosthetic hand he thinks can be sold for “less than \$5,000.”

“(That price point) puts it within reach of funding agencies and families, and within reach of a lot more children,” he said.

He keeps the price down with efficient material usage in the dialled-in printing process and takes advantage of open-source software.



### Engineer invented the device that saved his own life

*Canoe.com* - The first heart Tal Golesworthy saved was his own. Born with Marfan syndrome, a genetic disorder affecting the body’s connective tissue that can cause the aorta to stretch and rupture, Golesworthy lived life with a ticking time bomb in his chest.

But Golesworthy, a chemical engineer by training, was terrified by the prospect of open heart surgery. Instead, he set out to defuse that bomb. His invention, ExoVasc, a synthetic sleeve that reinforces the aortic artery, has now been used in 81 patients in the UK and elsewhere.

Golesworthy had been having regular scans of his heart to measure how much his aorta was stretching because of the Marfan syndrome. In 2004, when scans showed it was reaching dangerous levels, he spoke to a heart surgeon about what needed to be done.

He didn’t like what he was told: His body temperature would be lowered to 18 C, he’d be hooked up to a cardiopulmonary bypass machine, his heart would be stopped. Then he’d spend the rest of his life on blood thinners, balancing on a tightrope between bleeding to death or a stroke-causing blood clot.

“I thought to myself, this is an engineering problem. I asked (the surgeon), “Why aren’t we scanning the aorta. CAD-modelling it, then rapid-prototyping a model and using that to make a support?” Golesworthy said, “He just said, ‘What?!’”

But the surgeon was willing to listen as Golesworthy brainstormed an alternate method of treatment.

ExoVasc sleeves have been installed successfully in 80 patients. The implants have been done in six countries, including the UK, Belgium, Poland and New Zealand. The US Food and Drug Administration is also studying the device, which could pave the way for its use in North America.



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# Calendar Of Events



SkyscraperPage Forum

## **Alberta's Electricity Future**

December 2, 2016

Calgary, AB

[www.apega.ca/members/events/detail/282](http://www.apega.ca/members/events/detail/282)

## **CSCE Communication Seminar: Meeting Skills and Conflict Resolution**

December 5, 2016

Saskatoon, SK

[www.cscesaskatoon.com/](http://www.cscesaskatoon.com/)

## **Women's History Month - 20 Years of Women's Professional Leadership**

December 6, 2016

Regina, SK

[www.apegs.ca/Portal/Pages/event-details-7/8128](http://www.apegs.ca/Portal/Pages/event-details-7/8128)

## **APEGS Continuing Professional Development Program Overview**

December 15, 2016

Yorkton, SK

[www.apegs.ca/Portal/Pages/event-details-7/32631](http://www.apegs.ca/Portal/Pages/event-details-7/32631)

## **Environmental Technology**

January 12, 2017

Edmonton, AB

[www.apega.ca/members/events/detail/278](http://www.apega.ca/members/events/detail/278)

## **Design of Hydraulic Structures**

January 16-18, 2017

Vancouver, BC

[www.apeg.bc.ca/Events/Events/2017](http://www.apeg.bc.ca/Events/Events/2017)

## **Speaking as a Leader**

January 19, 2017

Webinar

[www.apeg.bc.ca/Events/Events/2017](http://www.apeg.bc.ca/Events/Events/2017)

## **Women in Leadership**

January 31, 2017

Webinar

[www.apeg.bc.ca/Events/Events/2017/17JANWIL](http://www.apeg.bc.ca/Events/Events/2017/17JANWIL)

## **Fundamentals of Project Management**

February 1-2, 2017

Vancouver, BC

[www.apeg.bc.ca/Events/Events/2017](http://www.apeg.bc.ca/Events/Events/2017)

## **Introduction to Hydrogeology and Groundwater Management**

February 23, 2017

Vancouver, BC

[www.apeg.bc.ca/Events/Events/2017](http://www.apeg.bc.ca/Events/Events/2017)

## **International Conference on Water Management Modeling (ICWMM)**

March 1 - 2, 2017

Brampton, Ontario

[www.icwmm.org](http://www.icwmm.org)

## **Registration Deadline for Spring Professional Practice Exam and Law & Ethics Seminar**

March 17, 2017

Online

[www.apegs.ca](http://www.apegs.ca)

## **2017 CISC Steel Design Awards**

April 5, 2017

Winnipeg, MB

[www.cisc-icca.ca/awards/manitoba/2017](http://www.cisc-icca.ca/awards/manitoba/2017)