

JANUARY/FEBRUARY 2018

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ENGINEERING DIMENSIONS



30

FEATURES

- 30 **RALLYING TO CHANGE THE RATIO**
By Natalya Anderson
- 34 **REACHING 30 BY 30**
By Marie-Ange Janvier, PhD, P.Eng.,
Monique Frize, PhD, P.Eng., FEC, and
Kim Greenwood, P.Eng.
- 36 **25 OUTSTANDING FEMALE ENGINEERS**
By Michael Mastromatteo

SECTIONS

ASSOCIATION BUSINESS

- 5 Editor's Note
6 President's Message
26 GLP Journal
52 In Council

NEWS AND COMMENTARY

- 8 Amendments to engineering act enhance transparency and public safety protection; Steinberg set to step down from consulting engineers post; Attorney General visits PEO; 70th OPEA gala celebrates engineering across all generations; Chapters look to disruptive technology; PEO steps up PEAK communications effort; Volunteers look to adapt leadership styles to enhance committee involvement; PEO member named Ontario's chief scientist; Local innovations focus of Peterborough Chapter event; Students urged to combine learning with relationship building;

PEO registrar to take on top role at Engineers Canada; PEO committee stages École Polytechnique memorial ceremony

- 22 National Engineering Month Listings
27 Viewpoint: When it comes to gender, we may have something to teach
45 Awards
49 Datepad
50 Profile: Engineering a Kodak career
56 Letters

PROFESSIONAL ISSUES

- 28 Ethics: Life after Charbonneau

ADVERTISING FEATURES

- 54 Professional Directory
55 Industry Profile
55 Careers & Classified
55 Ad Index



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easy-to-read website format, plus archived articles, social media buttons, a search function and a text-focused template for those who use text-to-speech readers.

Cover: Amma Wakefield, P.Eng., who works in a traditional engineering role, is one of the many women determined to create a network of engineers who rally to support one another.
Photo: Canan Hosseyini

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ENGINEERING'S HIDDEN TALENT

By Nicole Axworthy

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Last year, the Society of Women Engineers in the United States shared a collection of astonishing documents from its archives, which included letters, circa 1919, from deans and professors of prestigious universities explaining why women can't be admitted to engineering schools.

"We have not now, have never had, and do not expect to have in the near future, any women students registered in our engineering department," wrote Thorndike Saville, an associate professor at the University of North Carolina.

That same year, the United States Congress passed the 19th amendment, granting women the right to vote—in Canada, this occurred a year earlier—but, as so many of the letters demonstrate, women wouldn't be permitted to formally study subjects like engineering until much later.

Today, nearly a century later, women have come a long way in education now that they represent 20 per cent of students in accredited engineering programs in the country. This is a ray of light in the effort to become a more inclusive profession. But statistics also show a portion of them either quit or never enter the profession, so it seems the forces that

push women out of the field—or even prevent them from pursuing it in the first place—remain persistent and complex.

Last September, PEO Council endorsed a lofty goal set by Engineers Canada to increase the number of women entering the profession over the next 12 years—otherwise known as "30 by 30" (see p. 6). Can we get there? It's hard to predict, but I do believe the increased recognition of women engineers' achievements and the proliferation of stories such as *Hidden Figures* (this Academy Award-winning film is a must-see) are moving us in the right direction, which is why we are dedicating this issue to the subject. Here, we feature women professionals who are pursuing their passion and encouraging more girls to consider engineering for their future (p. 30) and who are inspired to reach the 30 by 30 goal within their own workplace (p. 34). Starting on page 36, we also spotlight 25 impressive women engineers who are making their mark in what some may consider traditional male roles.

On a final note, don't forget to check out who's running for available positions on PEO Council. Candidate statements can be found in this issue's insert. Voting opens on January 19, so don't delay getting in yours. Happy 2018! [e](#)



THIS ISSUE The focus this time is on the profession's ongoing efforts to accommodate women professionals. In addition to highlighting the struggles of some women engineers to adjust to working in a traditionally male-dominated environment, we feature 25 high-achieving women executives whose career progress raises hopes for the success of Engineers Canada's "30 by 30" campaign.

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Through the *Professional Engineers Act*, PEO governs licence and certificate holders and regulates professional engineering in Ontario to protect the public interest.

NAVIGATING THE GLASS OBSTACLE COURSE

By Bob Dony, PhD, P.Eng., FIEE, FEC



“Gender equality is not a women’s issue; it is a human issue. It affects us all.”

—Malala Yousafzai

At PEO’s 2017 Annual General Meeting (AGM) in Thunder Bay, Ontario, I mentioned Engineers Canada’s “30 by 30” initiative. It is the

goal of raising the percentage of newly licensed engineers who are women to 30 per cent by the year 2030. Why 30 per cent? It is widely seen as a critical mass, a threshold for self-sustaining change. This is not a plan for increasing the percentage of women by decreasing the number of men—a comment I unfortunately hear even now. It is an initiative to identify and work towards reducing the barriers that have contributed to the lower numbers of women entering the profession and obtaining their licence—the glass obstacle course, as some have called it. The goal is to simply increase the number of women entering the profession by this critical amount.

Since its launch in 2011, all the provincial and territorial engineering regulators across the country have signed onto the 30 by 30 goal except—until recently—PEO. I am happy to say that at the September 2017 Council meeting PEO stepped up and endorsed the plan. As president of PEO, I was pleased to move the motion that “Council formally endorses Engineers Canada’s 30 by 30 initiative” and works with the Ontario Society of Professional Engineers (OSPE), the Ontario champion of the initiative, to develop a joint action plan to move forward.



HOW CAN THE PUBLIC, ON WHOSE BEHALF WE REGULATE THE PROFESSION OF ENGINEERING, HAVE THE FULLEST OF CONFIDENCE IN US AS A SELF-REGULATOR IF WE ARE NOT REFLECTIVE OF THAT SAME SOCIETY?

Now, the delay in PEO signing onto the initiative was, in some respect, understandable. Unlike other jurisdictions, we have a separate advocacy organization, OSPE. When OSPE was created, as part of the transfer of non-regulatory programs from PEO to OSPE, the programs of the Women in Engineering Advisory Committee (WEAC) were transferred to OSPE. So, when the 30 by 30 initiative was announced, it was natural that OSPE signed on as the Ontario champion.

However, it is only appropriate that PEO also sign on. The initiative is both an advocacy and a regulatory issue because it also involves the licensing of engineers—more specifically, addressing the chronic underrepresentation of women in the profession. Currently, only 13 per cent of professional engineers in Canada and 15 per cent of newly licensed engineers in Ontario are women. Other professions, such as law, medicine and business, have already achieved, or are making greater strides, in gender parity. Given that women make up over 50 per cent of the population, reaching gender parity and tapping into the full talent pool is in the public interest. Assuming responsibility for this initiative, where appropriate, falls well within PEO’s regulatory mandate. How can the public, on whose behalf we regulate the profession of engineering, have the fullest of confidence in us as a self-regulator if we are not reflective of that same society?

Council has committed to working with OSPE to create a joint action plan, to augment the work that OSPE has already undertaken. Engineers Canada has published a list of best practices on its website (www.engineerscanada.ca/diversity/women-in-engineering/30-by-30), many of which are already in place. PEO already has a very active Equity and Diversity Committee, whose mandate is to work towards integrating “equity and diversity values and principles into the general policy and business operations of PEO” and OSPE, as mentioned, has WEAC, whose goal is “to work toward the creation of a more progressive and diverse engineering profession by encouraging the full participation of women in the profession.” We already track many gender-based statistics that we share nationally. And our new 2018-2020 Strategic Plan includes an objective to “create a seamless transition from student member to EIT to licence holder,” where we can examine the uptake of women to the profession through these stages leading to licensure.

Many universities have already taken the lead. The two largest engineering schools in the province, the University of Waterloo and the University of Toronto, have women making up 30 per cent and 40 per cent of their first-year class, respectively. Is it a coincidence that both their engineering deans are women?

Obviously, there is still much work to be done. I also think most of us acknowledge that this must be but one part of a larger plan to address issues of equity, diversity and inclusion within our profession.

AVOIDING UNCONSCIOUS BIAS

At the AGM, I asked: “Can we at PEO take a leadership role and exceed this [30 by 30] goal for our own leadership?” Internally, within PEO, are we doing a good enough job to be reflective of, not just the profession, but society as a whole? There have been many times at PEO when I’ve looked around the room and wondered why there aren’t more women at the table—and there are numerous

reasons why there may be an underrepresentation of women, both explicit and unconscious.

As noted in one of the feature articles in this issue (p. 33), the Ontario Network of Women in Engineering (ONWiE) has many resources on their website explaining such gender equality issues (www.onwie.ca/resources-tools): Is language use inclusive? Are individuals concerned about being viewed through the lens of a stereotype? Are cultural references broad and inclusive? Any one of these issues in and of itself may not be a significant impediment but taken together may lead to an atmosphere where one feels they don't belong. I also recommend our own equity and diversity online learning module, "Engineers Make a Difference for Equity and Diversity," accessed through PEO's online learning module library at www.peo.on.ca/index.php/ci_id/30268/la_id/1.htm.

One very subtle but potentially impactful impediment is unconscious bias. This is where, without thinking, we make conclusions and assumptions that can affect our view of an individual. We do this regularly without much thought, and many times it may be quite benign. I have to confess that my most embarrassing example of this happened a few years ago. I received an email from the Institute of Electrical and Electronics Engineers with the heading "With the Arduino, Now Even Your Mom Can Program" with a reference to an *IEEE Spectrum* magazine article titled "The Making of Arduino." I fell right into the bias trap. I immediately pictured my mother-in-law—my wife and I have spent countless hours helping her with her computer—and smiled. Later that day another email arrived from the editor-in-chief of the *IEEE Spectrum* herself, Susan Hassler, apologizing for the first email, saying, "I'm an IEEE member, and a mom, and the headline was inexcusable, a lazy, sexist cliché that should have never seen the light of day." And then I thought of my daughter, who is now an engineering intern. How would she have reacted to that email, given that her mom—my wife—has had a very successful career in software development as a computer science graduate from the University of Waterloo?

AN OPTIMISTIC FUTURE

Catherine Karakatsanis, P.Eng., FEC, chief operating officer of Morrison Hershfield Group Inc., former PEO president (2009 to 2010) and 2017 Ontario Professional Engineers Awards Gold Medal winner (see p. 10), spoke of the problems facing women in engineering so eloquently during her remarks on November 18, 2017, when she accepted her gold medal:

"Attracting and retaining women in engineering is of great importance to me and I'm very concerned about the gender imbalance. As many studies have shown, having a balance between the number of men and women in organizations leads to superior innovation and financial performance. So, inclusivity is good business. Yet, respected studies have shown that 50 per cent of women are driven out of companies and the field altogether, due in no small part to a culture that is not always as accepting as it could be or should be.



ONE VERY SUBTLE BUT POTENTIALLY IMPACTFUL IMPEDIMENT IS UNCONSCIOUS BIAS. THIS IS WHERE, WITHOUT THINKING, WE MAKE CONCLUSIONS AND ASSUMPTIONS THAT CAN AFFECT OUR VIEW OF AN INDIVIDUAL. WE DO THIS REGULARLY WITHOUT MUCH THOUGHT, AND MANY TIMES IT MAY BE QUITE BENIGN.

"The best way to change this is, first, to acknowledge that these cultural challenges exist and talk about them openly and candidly. It's only by talking about these issues that firms can begin to do what is necessary to address them.

"And we have to do our part to meet that audacious 30 by 30 goal set by our national body, Engineers Canada, and adopted by all the associations across the country... Now this is a complex problem and achieving 30 by 30 will be a challenge. But I know we can do this. After all, we're engineers and we solve complex problems every day.

"In the meantime, I am very optimistic regarding the future for women in engineering. Though women are underrepresented, Canadian engineers have not hesitated to have women lead their professional organizations. Women in Canadian engineering have the opportunity to assume a larger role within the industry and to become leaders in the field. And this is a great credit to us all."

I, too, share Catherine's optimism. As a university professor and father of three budding engineers, I am encouraged to see how this new generation takes the problems of increasing equity, diversity and inclusion to heart. They seem to understand naturally that the more diverse and inclusive an organization is, the healthier it is. As the profession renews itself through bringing in the new generation of practitioners into leadership roles, aided by Council's term limits and succession-planning initiatives, with its diverse views and demographics, I'm confident our profession will eventually be truly reflective of the society on whose behalf we regulate the engineering profession. **e**

AMENDMENTS TO ENGINEERING ACT ENHANCE TRANSPARENCY AND PUBLIC SAFETY PROTECTION

By Michael Mastromatteo

PEO officials applaud passage of recent amendments to the *Professional Engineers Act* (PEA) intended to strengthen regulation of the engineering profession. Amendments to the PEA, contained in Schedule 34 of the Ontario government's *Stronger, Fairer Ontario Act, 2017* (Bill 177), received royal assent in the legislature on December 14, 2017.

"For the past three years, PEO has worked with the Ministry of the Attorney General to identify changes to the act necessary to improve public safety protection and transparency respecting the practice of engineering in Ontario," says PEO Registrar Gerard McDonald, P.Eng. "With the passage of Bill 177, we're pleased PEO can make these changes to improve our transparency, accountability and effectiveness in regulating professional engineering."

The latest changes also address issues raised by the June 2012 Algo Centre Mall collapse and the ensuing Elliot Lake Commission of Inquiry.

Key amendments under Bill 177 include:

- Regulation-making authority to create continuing education requirements for licence holders, including sanctions for non-compliance (PEO has already introduced its Practice Evaluation and Knowledge (PEAK) program, which gauges continuing knowledge activities of licence holders and provides recommended continuing education hours for each practising

licence holder to maintain knowledge and skills commensurate with safeguarding the public interest);

- Powers to refuse to issue, suspend or revoke a licence—where warranted by past conduct—to emulate what already exists for certificates of authorization and temporary, provisional and limited licences;
- A transparency amendment to require licence holders' disciplinary histories to be made publicly available, including on PEO's website—regardless of whether the individual was found guilty or not guilty;
- An amendment to alter the composition of PEO disciplinary hearing panels to expedite the formation of panels for speedier resolution of disciplinary cases;
- An amendment to allow members of the public, for a fee, to obtain copies of evidence in proceedings before PEO's Discipline Committee;
- An amendment to allow PEO's registrar to forward information—where there is a public safety concern—to the appropriate regulatory organization for further investigation or actions under that organization's jurisdiction; and
- Affirmation of PEO's jurisdiction, with specific reference that:
 - a member who resigns or a holder of a licence, temporary licence, provisional licence, limited licence or certificate of authorization that is cancelled or revoked continues to be subject to the jurisdiction of PEO in respect of any professional misconduct or incompetence referable to a time when the person was a member or holder; and
 - a person whose licence, temporary licence, provisional licence, limited licence or certificate of authorization is suspended remains subject to the continuing jurisdiction of PEO for all purposes under the PEA.

The amendments to the PEA took effect immediately upon proclamation.



STEINBERG SET TO STEP DOWN FROM CONSULTING ENGINEERS POST

By Michael Mastromatteo

Consulting Engineers of Ontario (CEO) is on the lookout for a new top administrator following the February 2018 retirement of Chief Executive Officer Barry Steinberg, P.Eng., C.E.T.

Steinberg, who joined CEO in January 2010, is stepping down after a long career in engineering and executive management. He announced

Barry Steinberg, P.Eng., C.E.T., headed Consulting Engineers of Ontario since January 2010. He officially retires from the organization on February 23.

his plan to retire in the fall of 2017, giving CEO six months to come up with a successor.

Steinberg leaves CEO well positioned for growth, expansion and influence with the provincial government. "What I'm proud of is that I've built an organization that doesn't really need me," Steinberg told *Engineering Dimensions*. "What I mean by that is when the new CEO comes in, he or she can rest assured that they have an organization they can operate, and he or she can focus on the progress they want to achieve. I feel good that I've left a strong organization with a very good staff."

Steinberg's key accomplishments as head of the 220-firm consulting engineers' organization included achieving the goals of its latest strategic plan and raising the CEO profile within government, the engineering community and the public in general.

"Things are looking very good as I step down," Steinberg says. "The members wanted profile, they wanted visibility, [and] they wanted to be considered important by both government and clients. I think we're doing that. We've made a lot of changes on the government relations side of things and on the business risk side of things."

Before joining CEO in 2010, Steinberg served as director of marketing for the Ontario Real Estate Association. Since graduating from the University of Toronto in 1982 with bachelor's and master's degrees in mechanical engineering, Steinberg has had a varied career in manufacturing, marketing and government relations.

It was this latter skillset that became invaluable to PEO as it established its Government Liaison Committee (GLC) in 2011. As the first-ever chair of the GLC, Steinberg brought a wealth of government relations experience to the fold. "I think the relationship we had with government at CEO allowed me to be more productive at [PEO's] GLC and then focus on regulatory issues, which I always believed in, and I know PEO believes it should stick to regulatory issues as well," Steinberg adds. "We were very active in government

relations with the consulting engineers and I think that helped me work with the GLC as it evolved."

Jeannette Chau, P.Eng., PEO's manager, government liaison programs, worked extensively with Steinberg through the GLC and notes his value to the committee: "Barry brought an understanding of the consulting engineering field that was helpful to understanding that side of the regulatory environment. He was a respected man with an understanding of the issues, which enabled him to work well with the various organizations in the engineering community."

Rex Meadley, P.Eng., current chair of CEO, says Steinberg's government relations work was a bonus for both the consulting engineers and PEO. "Barry has always been highly regarded and respected by all his peers. He has developed a very significant network of all the people our industry touches at all levels, especially among government officials."

Meadley also cited Steinberg's emphasis on meeting CEO's strategic objectives. "In my mind, Barry's great accomplishment has been moving CEO more in line with the strategic plan and operationalizing that plan to better CEO's strategic goals on advocacy, business practices and member engagement."

Over the years, Steinberg has sat on a number of committees, including the Advisory Board for the Ontario Provincial Standards for Roads and Public Works, PEO's Consulting Engineer Designation Committee and the Advocacy Priorities Committee at the Ontario Society of Professional Engineers. He was also chair of the Construction and Design Alliance of Ontario for two terms.

continued on p. 10



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continued from p. 9

Steinberg anticipates the consulting engineers will maintain healthy relations with PEO and other stakeholders in engineering. "I am fine with the CEO-PEO relationship, but we don't see eye to eye on everything," he says. "I don't think that should have any impact on a good relationship. You don't have to agree on everything to have a good relationship."

Steinberg will remain on some boards after he retires but plans to spend more time with his wife, children and three grandchildren. He also plans to devote more time to his music. "I am a drummer in a blues band called Willful Blues," he says. "We play Chicago, Texas and west coast blues plus some swing. Willful Blues has been together for nine years and we plan to record when I retire."

ATTORNEY GENERAL VISITS PEO



Attorney General Yasir Naqvi (MPP, Ottawa Centre) met with the Discipline Committee at PEO headquarters on November 27, 2017 to discuss current issues affecting the profession. PEO Lieutenant Governor-in-Council Appointee Lew Lederman played a key role in getting the attorney general to meet with the committee.

70TH OPEA GALA CELEBRATES ENGINEERING ACROSS ALL GENERATIONS

By Michael Mastromatteo



The 2017 OPEA winners are (clockwise from top left) Nicholas Stark, P.Eng., Maximilian Mantha, MBA, P.Eng., Endre Bakos, P.Eng., C.E.T., Jan Andrysek, PhD, P.Eng., Craig Simmons, PhD, P.Eng., Paul Santerre, PhD, P.Eng., Catherine Karakatsanis, P.Eng., FEC, Benny Pang, P.Eng., Samantha Espley, P.Eng., and Margaret Kende, P.Eng. Absent from the photo is Tom Murad, PhD, P.Eng., representing award winner Siemens Canada.

A total of 11 high-achieving engineers and organizations shared the spotlight November 18, 2017 at the 70th annual Ontario Professional Engineers Awards (OPEA) event in Toronto.

The theme of the milestone gala, "Engineering: past, present and future," reflected the aims of the OPEA organizers to celebrate engineering achievement over the last several generations, but with an eye to future opportunities.

Since 1947, the OPEA event has saluted Ontario engineers who have made significant contributions to the profession and their community. The annual awards gala is hosted jointly by PEO and the Ontario Society of Professional Engineers.

A host of individual and corporate engineering achievement was on display for the event, including success stories in biomedical technology, process safety, hostile environment Wi-Fi connectivity, and entrepreneurial product development and marketability.

And in keeping with the profession's commitment to diversity and inclusiveness, some of the award-winning engineers highlighted the importance of promoting leadership opportunities for women practitioners.

John Severino, P.Eng., an executive with PEO's North Bay Chapter and chair of the Awards Committee, shared opening remarks and introduced Toronto radio personality John Moore as master of ceremonies for the event.

Following are excerpts from the acceptance speeches of the 11 award recipients. Full biographies of award winners are available on page 13 of the

September/October 2017 issue of *Engineering Dimensions*. Video tributes of award recipients are available on PEO's YouTube channel at www.youtube.com/PeoOnCa.

PROFESSIONAL ENGINEERS GOLD MEDAL

Catherine Karakatsanis, P.Eng., FEC, chief operating officer, Morrison Hershfield Group Inc.

"It is so hard and humbling to be recognized by my peers and to receive this award tonight.

"I am here tonight because of the many people I've been surrounded by and associated with.

"I begin by thanking PEO, OSPE and the Awards Committee for considering me worthy.

"I got my start at the University of Western Ontario. It was an extraordinarily inspiring and inclusive atmosphere, and that's very important when you're a female in engineering, and it continues today. I started out in my career as a structural engineer but then the early '90s recession set in, and I had to branch out—so I have worked in almost every part of our company. I was blessed to be in a firm that respected and valued my work, despite my being a woman in a very male environment. Unfortunately, that is not always the case for many women in the engineering

industry. Attracting and retaining women in engineering is of great importance to me, and I'm very concerned about the gender imbalance. As many studies have shown, having a balance between the number of women and men in organizations leads to superior innovation and financial performance. So inclusivity is good business."

ENGINEERING MEDAL—ENGINEERING EXCELLENCE

Endre (Andrew) Bakos, P.Eng., C.E.T., project manager, Toronto Transit Commission

"I never believed I would be standing here and accepting such an award. I have never felt better about being an engineer and about being a member of such a great organization as PEO.

"Bringing Wi-Fi and cellular communications to the Toronto Transit Commission underground is truly what we engineers stand for...to serve and protect the public."

Nicholas Stark, P.Eng., vice president, HH Angus & Associates Limited

"I am honoured and humbled to receive this excellence award. I want to salute the people at Canadian Standards

continued on p. 12

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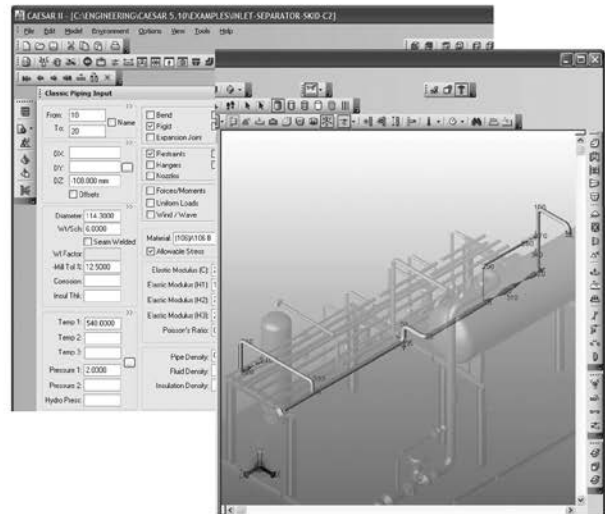
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continued from p. 11

Association, where I had the opportunity to work for the last 25 years. It's important that standards development become more universal across the country as these ultimately drive better regulation and better health outcomes. I will mention what seems to be a theme tonight: family connections. My father was an engineer, my wife, my two children, my sister and my brother are all P.Engs. Thank you all for being here with us tonight to help celebrate."

ENGINEERING MEDAL—ENTREPRENEURSHIP

J. Paul Santerre, PhD, P.Eng., professor, University of Toronto

"Many thanks for this award and I offer my congratulations to all the other recipients tonight.

"I'm grateful to receive an award from the professional association that oversees the career I have chosen. I'm also honoured to be an award winner in the entrepreneurship category.

"In facilitating and supporting colleagues who have wanted to start businesses, I always tell them right at the beginning to ensure that they write down why they are doing this, why they are undertaking this because there will be many challenges along the way—things that come and snag you, and lots of ups and down—and that rationale (for writing it down) will be the beacon that will actually take you through many of those challenges.

"We live in a very privileged province, a very privileged country. In this country, we are among the highest post-secondary educated citizens in the world. But we still bat below our average on entrepreneurship. We do very good, but we can be outstanding. My last words tonight are to encourage all the entrepreneurs here. If you are not involved in mentoring, in picking up this next generation of entrepreneur engineers who have a desire and the potential, I encourage you to become actively involved as soon as possible."

ENGINEERING MEDAL—MANAGEMENT

Samantha Jane Espley, P.Eng., technical director, Vale Base Metals

"I am especially honoured when I look at all the other recipients who have been up here tonight and those who have gone before me—truly amazing people on our planet—and I am very humbled to be standing shoulder to shoulder with you. Early in my career, I saw a mirror in a changeroom. Beneath that mirror was a sign, 'You are looking at the person responsible for your safety.' It's a little motto that I've taken with me through my entire life and career, and it applies to more than just safety.' When you look at the mirror, you are looking at the person responsible for making change, for doing what's right, for working together, to make this place a better place. So I have taken that to myself personally, to educate those I work with, those in my family, my colleagues and my friends, and say that together we are all responsible to make the changes for improving our business and our planet."

ENGINEERING MEDAL—RESEARCH AND DEVELOPMENT

Jan Andrysek, PhD, P.Eng., scientist, Bloorview Research Institute

"My dad was also an engineer who helped me realize that engineering was something I wanted to do from very early on. I want to thank PEO and OSPE for their efforts to celebrate engineering work. I also want to thank my colleague Dr. Tom Chau (P.Eng.) and my colleagues at Holland-Bloorview. Some of what I do would not be possible without their support."

Craig Alexander Simmons, PhD, P.Eng., professor, University of Toronto

"Thanks to PEO and OSPE for this great recognition and for hosting this wonderful event celebrating so many inspiring engineers and their accomplishments. I'm particularly delighted to be receiving this award alongside my colleague, J. Paul Santerre, a long-time collaborator, friend and mentor. Paul, Jan (Andrysek) and I are all part of the Institute of Biomaterials and Biomedical Engineering at the University of Toronto, where we work to solve the most pressing health problems and, in my case, engineering healthy hearts. These are inherently challenging problems that cannot be solved by traditional engineering approaches. We are very fortunate to work in a remarkable institution supported by our dean and the chairs of our departments...who have all created an environment in which engineering, medicine and biology can come together seamlessly and enable outstanding interdisciplinary team research."

ENGINEERING MEDAL—YOUNG ENGINEER

Maximilian Albert Thomas Mantha, MBA, P.Eng., vice president, area manager, EllisDon Toronto Civil and Looby Construction

"I am so honoured to be recognized like this tonight. It's a very special moment in my career so far. When I was notified of this PEO award, I realized how lucky I've been and how fortunate I have been to have the employers I've had, the tremendous mentors I've had, who have provided me with amazing, incredible opportunities and lots of different challenges. I would like to thank my father Ray Mantha (P.Eng.), my mother, and my wife Julia Reed, and our eight-month-old daughter, Olivia. Finally, I hope to give back to this profession and to grow other young leaders and be involved with other young professionals, and one day share what I am learning now and help to grow the business and the organization."

CITIZENSHIP AWARD

Margaret Kende, P.Eng., president, Anteus Enterprises, and former dean of engineering technology, Centennial College

"It is with humility, gratitude and joy that I accept the 2017 Ontario Professional Engineers Citizenship Award. I commend PEO for establishing this award category that recognizes and celebrates a member's volunteer work in civil society. If we know the issues of the community, we can better and more effectively be the problem-solvers for the common good. I want to thank my family, my nominators

and my supporters. I also want to cite Claudette MacKay-Lassonde (P.Eng.), who inspired me to get involved with Women in Science and Engineering (WiSE) and Dr. Ursula Franklin, who inspired me to help immigrant women engineers navigate the channels to their first jobs in Ontario. I congratulate all PEO award recipients. I am honoured to be in their company."

Benny Pang, P.Eng., knowledge domain owner (acoustics) and principal engineering specialist, Bombardier Inc.

"I will treasure this meaningful award for the rest of my life. I want to thank the man who first hired me and who allowed me to be 'the noise man' and pursue an interesting career for almost half a century."

AWARD FOR ENGINEERING PROJECT OR ACHIEVEMENT

Siemens Canada, Dual Education Program

Tom Murad, PhD, P.Eng., head of Siemens Canada Engineering and Technology Academy

"Thanks to PEO and OSPE for recognizing what Siemens is doing. I want to draw on the past, present and future of tonight's celebration. I came to this country about 25 years ago and it was my dream to be recognized as an engineer in Canada. One of my early mentors is here—he believed in me when I was a young new engineer. For the present, I am honoured to be working for a great company at Siemens Global. The spirit of the company and its engineering and technology academy fulfils my heart as an engineer. The core of Siemens is belief in young engineers and the great people who work for them. At Siemens Canada, we are towards the vision to encourage everybody to do what Siemens is doing—encouraging new generations to use engineering to do what needs to be done without waiting for the government or special funding to come through first."

CHAPTERS LOOK TO DISRUPTIVE TECHNOLOGY

By Michael Mastromatteo

PEO is looking to its 36 chapters and their embracing of disruptive technologies as a new source of ideas and pathways to regulatory enhancement.

As noted at the November 18, 2017 Chapter Leaders Conference (CLC) in Toronto, chapter volunteers can bring more to PEO than just representing the engineering profession in their local region. Instead, chapters are being groomed as an underutilized resource to provide new leaders and fresh ideas in moving the profession forward. As well, chapters are being viewed as potential "branch offices" for PEO in delivering regulatory outreach programs.

The theme for the conference was "PEO 4.0, moving to the future." The 4.0 refers to the latest wave in industry and lean manufacturing in computers, automation, data collection, decentralized decision making and innovative processes all coming together in a dynamic new way.

In welcoming participants, CLC Organizing Committee Chair and PEO Western Region Councillor Lola Hidalgo, P.Eng., described the CLC as the Regional Councilors Committee's "flagship event" dedicated entirely to chapter operations.

PEO President Bob Dony, PhD, P.Eng., FEC, later reiterated the view of chapters as the "heart of PEO" and urged individual chapter volunteers to reconsider how they can contribute to the regulatory process.

Keynote speaker Mike Dover, a social media expert and a professor of marketing at Humber College in Toronto, outlined how technology is presenting new marketing and communication opportunities, and how chapters can take advantage not only to implement more effective local programs but also to improve the overall regulatory function.

In fact, several of the conference's breakout sessions were devoted to the examination of chapters as a resource in promoting awareness of engineering and the value of self-regulation.

continued on p. 14

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PEO Registrar Gerard McDonald, P.Eng., discussed the 2018-2020 Strategic Plan at the 2017 CLC.



Social media expert Mike Dover was keynote speaker at the 2017 CLC.

continued from p. 13

Participants later completed a Kaizen exercise to apply lean manufacturing concepts to overcome the persistent problem of engaging newly licensed members in their local chapter. Originating in the Japanese business community, Kaizen refers to continuous incremental improvement in any process or system.

Leading off the conference, PEO Registrar Gerard McDonald, P.Eng., updated chapter volunteers on developments with PEO's 2018-2020 Strategic Plan, which had been approved at the November 17 Council meeting. McDonald outlined the plan's nine strategic objectives and how they relate to chapter work. "Like everything else at PEO, the latest strategic plan begins and ends with the chapters," McDonald said.

The afternoon consisted of eight separate break-out sessions where moderators and chapter volunteers discussed various ways chapters might realize the "branch plant" concept. Among the topics debated were chapter efforts to enhance the PEO brand, use of disruptive technologies to improve engineering regulation, potential modifications to Council elections (and PEO operations in general), how PEO can streamline its overall processes, enhanced use of mobile computing, and what disruptions PEO can leverage to contribute to the association and the profession in general.

Before participants got ready for the evening's Ontario Professional Engineers Awards gala, PEO President-elect David Brown, P.Eng., BDS, C.E.T., told delegates that Council is committed to serving as an advocate for chapter concerns. "Let's make sure the information and ideas raised today are not filed away and forgotten, but are seriously considered in making the chapter system a more valuable resource for regulation," Brown said.



Tyler Ing, P.Eng., discussed PEO's PEAK program with chapter volunteers.

BITS & PIECES

At Aerovelo, a team of aerospace engineering graduates from the University of Toronto designed the fastest human-powered vehicle on earth, clocked at 144.17 kilometres per hour.



The suspension bridge at Scenic Caves in Georgian Bay—the longest footbridge in Southern Ontario, at 128 metres in length—offers a view of 10,000 square kilometres from a vantage point of 300 metres above the bay.



PEO STEPS UP PEAK COMMUNICATIONS EFFORT

By Michael Mastromatteo



PEO's Practice Evaluation and Knowledge (PEAK) program officials remain committed to an all-out communications effort as the data collection and knowledge assessment effort nears the end of its first year of operation.

The PEAK program was launched in March 2017 as a means for the regulator to gain a better understanding of members' practice environments, and professional development and knowledge opportunities.

Since hiring PEAK Program Coordinator Arden Heerah, P.Eng., in July 2017, PEO has stepped up its extensive communications effort to members. Program details have been communicated through six separate channels:

- traditional delivery (licence renewal notices, email, regular mail, brochures);
- *Engineering Dimensions* articles;
- social media (LinkedIn, Twitter, Facebook, YouTube);
- seminars (industry groups, government agencies, consulting firms);
- PEAK program team outreach (telephone responses, email, website technical support); and
- PEAK program website (peopeak.ca).

At last November's Chapter Leaders Conference in Toronto (see p. 13), PEO Registrar Gerard McDonald, P.Eng., updated chapter volunteers on the PEAK program rollout and urged them to consider staging local chapter events that could be eligible for knowledge activity hours (for self-declared practising engineers) under the program. Heerah emphasizes that the first year of the program is drawing near and licence holders

will again be invited to complete the program when they receive their renewal notices.

As well, second-year elements of the PEAK program are now in development and will be put into effect with the next cycle of renewals and program completion responses. For more information about the program, see "A PEAK refresher" on page 32 of the November/December 2017 issue of *Engineering Dimensions* or the PEAK website at peopeak.ca.

PEAK BY NUMBERS

Renewed licences: 60,472
 Declared practice status: 19,853 (33 per cent of renewals)
 Members practising: 15,073 (76 per cent of renewals)
 Members non-practising: 4780 (24 per cent of renewals)
 Completed questionnaire: 13,902 (92 per cent of practising)
 Reviewed ethics module: 11,079 (56 per cent of declared)
 Reported activities: 2837 (20 per cent of whom completed questionnaire)

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VOLUNTEERS LOOK TO ADAPT LEADERSHIP STYLES TO ENHANCE COMMITTEE INVOLVEMENT

By Michael Mastromatteo

PEO continues to provide cutting-edge insight and strategies to committee leaders looking to make best possible use of volunteer resources.

The latest example took place at the annual Committee Chairs Workshop on November 3, 2017 at PEO headquarters. The workshop, organized by PEO's Advisory Committee on Volunteers (ACV), focused on challenges and resolutions for more effective volunteer management.

An organization highly dependent on its team of about 1000 volunteers, PEO is always looking to enhance the volunteer experience and, in turn, develop leadership potential.

Key presenter for the day-long workshop was Gregg Brown, a Toronto-based authority on organizational behaviour and change management, and author of the niche market book *Ready Set Change...Again!*.

Key to Brown's presentation was advice about motivating potential volunteers and optimizing their behavioural tendencies to effect smooth-operating and efficient committee work.

Brown outlined his DISC® model of organizational behaviour, which essentially breaks down committee volunteers into four basic styles: dominance, influence, conscientiousness and steadiness.

"This model isn't about pigeonholing people, but rather helps adapt your organization's leaders to better manage volunteers' commitment," Brown said.

He later led participants through small group exercises to determine their own leadership styles and discussed how differing management styles can work together as a committee to achieve optimal results. Brown also emphasized that volunteers don't need additional motivation to do their roles. "Volunteers generally come to the task already motivated," he said. "What makes for a better-quality experience is when you can create the right environment in your committee to get input from all participants, not just the dominant or assertive types."

At the start of the day, PEO President Bob Dony, PhD, P.Eng., FEC, who took part in the full slate of activities, described the importance of volunteer recognition and leadership development to the engineering regulator. "As you all know, PEO as an organization cannot function without our committee volunteers," Dony said. "The volunteer base is a vital part of who we are and how we regulate the profession on behalf of the people of Ontario. I'm looking forward to working on these topics, participating, and hopefully we will come out stronger at the end of the day and will be able to do our job better."

In addition to Dony, 12 members of PEO Council attended the proceedings, as did two former presidents and Registrar Gerard McDonald, P.Eng. Sean McCann, P.Eng., vice chair of the ACV, was emcee for the event.

The ACV compiles information presented at each Committee Chairs Workshop to prepare the agenda for the following year's event. Current priorities for the ACV include: enhancement of volunteer training programs; recognition programs for volunteer service; effective protocols for ACV's interactions with Council, the registrar and other committees/task forces; and improved communication among the ACV, all volunteers and PEO members.



PEO Councillor-at-Large Christian Bellini, P.Eng., FEC (right), and President-elect David Brown, P.Eng., BDS, C.E.T., work through exercises at the Committee Chairs Workshop.



Noubar Takessian, P.Eng., FEC, East Central Region councillor (far left), and Lisa Lovery, P.Eng., Advisory Committee on Volunteers member, work with Committee Chairs Workshop facilitator Gregg Brown.

PEO MEMBER NAMED ONTARIO'S CHIEF SCIENTIST

By Michael Mastromatteo

A PEO member and a pioneer in tissue regeneration work has been named Ontario's first-ever chief scientist.

Molly Shoichet, PhD, LEL, is professor of chemical engineering and applied chemistry at the University of Toronto's Institute of Biomaterials and Biomedical Engineering. She was appointed to the chief scientist position November 17, 2017 after a 17-month recruitment by the Ontario Ministry of Research, Innovation and Science.

Shoichet told *Engineering Dimensions* she is honoured with the appointment. "I am very excited at the opportunity to work across sectors with colleagues in government, academia and industry to make a difference for all of us," she says. "I look forward to the challenges that lie ahead and am confident that, by working together, we can make a difference."

She will retain her current teaching and research position at the University of Toronto but anticipates devoting much of her time to the chief scientist role.

The appointment of a limited licence holder to the chief scientist office could address longstanding concerns that professional engineers lack influence in policy development. As chief science officer, Shoichet will work with research communities to champion high-quality science in government and education. The chief scientist is also expected to help



Molly Shoichet, PhD, LEL, is Ontario's new chief scientist.

the province decide on science-based policy issues, offer advice on future research and innovation projects and assist in development of a best science strategy for the province.

continued on p. 18

A photograph of a young boy wearing a blue and white helmet and a green and white hoodie, riding a blue bicycle outdoors. The background is a blurred green landscape with trees.

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ONTARIO POWER
GENERATION

continued from p. 17

A member of the Order of Ontario and author of nearly 600 papers and abstracts, Shoichet reports to Reza Moridi, minister of research, innovation and science.

"Molly Shoichet is one of the top biomedical scientists in the country, with indepth knowledge of Ontario's research community," Moridi said in a statement. "As chief scientist, she will help us continue a proud tradition of science and research excellence through evidence-based decision making and will open the world to the incredible innovative talent and technologies Ontario has to offer."

Shoichet is an expert in the study of polymers for drug delivery and tissue regeneration and a world leader in the areas of polymer synthesis, biomaterials design and drug

delivery in the nervous system. Her research focuses on strategies to promote tissue repair after traumatic spinal cord injury, stroke and blindness.

The new chief scientist holds the tier one Canada research chair in tissue engineering. She joined the University of Toronto in 1995 and was appointed university professor in 2014, an honour held by less than two per cent of the university's faculty.

Shoichet has a PEO-issued limited licence in the chemical engineering category, which limits the holder to teaching courses and conducting research in the engineering science and design areas.

LOCAL INNOVATIONS FOCUS OF PETERBOROUGH CHAPTER EVENT

By Michael Mastromatteo

Fostering innovation and business development by leveraging local resources highlighted the discussion October 28, 2017 at the annual Engineering Symposium organized by PEO's Peterborough Chapter.

The Ontario Association of Certified Engineering Technicians and Technologists (OACETT) and the local chapter of the Institute of Electrical and Electronics Engineers (IEEE) joined forces with the Peterborough Chapter in staging the day-long event.

Nearly 80 chapter members and guests attended the symposium, which adopted the theme "Local innovation driving success." The symposium focused on mid-sized communities' efforts to create innovation clusters by attracting engineering, business and entrepreneurial talent to the local region.

The event included exhibits by new start-up businesses in the Peterborough area, along with success stories of local companies. Keynote speaker Andressa Lacerda, PhD, for example, outlined the foundation and rapid expansion of Noblegen Inc., a Peterborough-based company producing "advanced ingredients dedicated to developing cost-effective, naturally-derived ingredients for the human nutrition industry." Although she is neither an engineer nor business development expert, Lacerda described how assembling the right combination of technical talent and entrepreneurial spirit drives business success.

"Southern Ontario brings a great combination of backgrounds that include agriculture, innovation and research, while being a few hours to major city centres both in Ontario and the US," Lacerda said. "We have leveraged this unique location, and Noblegen is now flourishing in the innovation sector."

The symposium included a brief presentation by Maryam Monsef, MP for the Peterborough-Kawartha riding and the minister of the status of women.

Monsef urged engineers and other community leaders to promote the profession and other STEM (science, technology, engineering and math) careers as a sure way to nurture innovation and allow communities to "harvest the abilities" of its future practitioners.

Peterborough Chapter Vice Chair Marcelo Sarkis, P.Eng. (left), with keynote speaker Andressa Lacerda, PhD, of Noblegen Inc. at the October 28 symposium.



Later in the afternoon, MPP Jeff Leal, Ontario minister of agriculture, food and rural affairs and the minister responsible for small business, spoke of the importance of engineers to the local economy, and cited the P.Eng. role in the development of airborne drones to help farmers monitor the health and status of their crops.

Other speakers attending the symposium included Tara Wellborn, C.E.T., who described the role of engineers and technicians in the long-term success of Peterborough-based Numet Engineering and its evolution as a division of the global Rolls-Royce Civil Nuclear Canada Ltd.; and Kris McNeely, who outlined the expansion of CDC, a local food supplier and distillery serving the Persian ethnic market.

Presenter Ross Green, P.Eng., later shared his experience in starting up Apricity Renewables Inc. (ARI), a Canadian professional engineering firm specializing in delivering engineering services for solar and renewables projects.

Nanda Affonso, P.Eng., chair of the Peterborough Chapter's Communications Committee, said the symposium success was a joint effort. "I was really impressed as to how well the local chapter of PEO, the IEEE and the OACETT executives worked collaboratively to bring together our annual symposium," she said.

STUDENTS URGED TO COMBINE LEARNING WITH RELATIONSHIP BUILDING

By Jeffrey Lee

The annual PEO Student Conference attracted more than 70 delegates from 13 Ontario engineering schools on November 3 to 5, 2017, where they discussed ways to invigorate the next generation of engineering practitioners. Held at Ryerson University in Toronto, Ontario, the conference adopted the theme "Motivate-Innovate-Integrate."

The conference was led by Ryerson engineering students Alexis Ostrowski and Obaid Ullah with their executive team. It focused on how motivation, innovation and integration can play a key role not only in the engineering workforce but also in the lives of engineering students.

The diverse and engaging speakers offered a perfect mix for the delegates. Speakers touched on relevant topics such as internships, networking, engineering impacts and how to start your own company.

Delegates gained special insights from PEO President Bob Dony, PhD, P.Eng., FEC, who discussed the impacts practitioners have on engineering around the world. Dony told delegates that the field they have chosen is one that is exciting and innovative.

Students also heard from Ontario Society of Professional Engineers President and Chair Jonathan Hack, P.Eng., who spoke about the major impact engineering has on politics, and how he envisions students playing a pivotal role in policy decisions.

Delegates also heard from officials with the Centre of Engineering Innovation and Entrepreneurship of Ryerson University and learned about what it takes to be a successful entrepreneur. They were asked a puzzling question: "What would you do to make the most money possible with only \$50, and with only one day to do it?"

The conference included a presentation from Rose Ghamari, a designer at Bombardier Aerospace, and former
continued on p. 20



Delegates at the 2017 PEO Student Conference included engineering students (left to right) Jessica Halberstadt, Cyline El-Bouchi, Connor Laderoute, Johan Prent, Logan McFadden, Daniel Kennedy, Sam Flavell and Chantal Lepage. The cymbal around Laderoute's neck is the mascot for the Carleton University student society's "engineering gong."



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Find the 2018 Council Elections candidate statements in this issue's insert. Go to PEOvote.ca for all election-related resources, including video recordings of this month's All Candidates Meetings.

Voting opens January 19. Count yours in.

continued from p. 19
 president of the Ryerson Engineering Student Society. As well, two PEO officials, Tracey Caruana, P.Eng., manager, engineering intern programs, and Sami Lamrad, EIT, student programs coordinator, addressed delegates about the regulator-engineering student relationship.

Delegates also heard from the award-winning Ryerson Hyperloop team that recently competed at SpaceX. Delegates learned about the major advancements made in this new technology.

On Saturday evening, November 4, delegates gathered for the formal banquet event. There, delegates heard from the keynote speaker, Jeanette Chau, P.Eng., manager, government liaison programs for PEO. Chau encouraged students to work hard in school but remember to have fun along the way because school is not only about academics but the relationships and experiences one gains along the way.

Overall, the conference was an amazing experience for the presenters, delegates and the executive team that put hours of work into organizing such an amazing event. "The PEO Student Conference provided me with a path to my professional future and a foundation for accomplishing success in entrepreneurship," said Alessandro Cunsolo, an aerospace engineering student at Ryerson University.

Officials from the Engineering Student Societies' Council of Ontario expressed their appreciation for PEO's ongoing support and said their executive team not only gained valuable knowledge but forged a relationship they will carry with them in the future.

[Jeffrey Lee is a vice president with the Engineering Student Societies' Council of Ontario.](#)

PEO REGISTRAR TO TAKE ON TOP ROLE AT ENGINEERS CANADA

By Michael Mastromatteo

Embarking on a new path, PEO Registrar Gerard McDonald, MBA, P.Eng., is leaving Ontario's engineering regulator in February to take on the top administrative position at Engineers Canada in Ottawa.

In an announcement made just days before the Christmas break, McDonald said he decided to accept the Engineers Canada offer after much soul-searching. An Ottawa resident who commuted to PEO each week during his four years at the PEO helm, McDonald is looking forward to returning to the nation's capital.

McDonald will take over for Stephanie Price, P.Eng., who was appointed interim CEO at Engineers Canada in January 2017.

McDonald, who came to PEO in January 2014, formerly served as assistant deputy minister of safety and security at Transport Canada. He came out of retirement to take on the PEO role.

He becomes the second PEO head to take over at Engineers Canada. Kim Allen, P.Eng., FEC, who served as PEO registrar from 2003 to 2012, was head of Engineers Canada until his departure in January 2017.

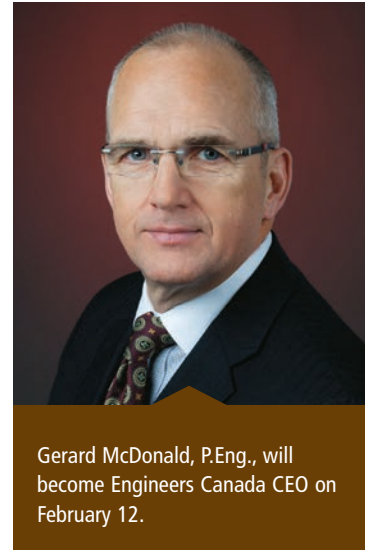
In a December 19, 2017 note to PEO employees, McDonald said, "It is truly with mixed emotions I am writing today to inform you that I have today been offered, and have accepted, the position of CEO at Engineers Canada."

He said the decision was not motivated by a desire to leave PEO but instead to continue to meaningfully contribute to the engineering profession while more conveniently addressing his personal realities.

"Indeed, my past four years here have been very fulfilling and satisfying," he added. "I am extremely proud of what we have accomplished together and excited about the groundwork we have laid for what lies ahead for the organization. I want to thank all of you for the support and friendship you have shown me over my tenure. It is very much appreciated."

PEO President Bob Dony, PhD, P.Eng., FEC, sent a note to members on behalf of Council wishing McDonald well in his new position and said they will have multiple opportunities to collaborate in the years to come.

"Some say the mark of a good leader is that they leave an organization stronger than when they arrived," said Dony. "Under Gerard's tenure, I truly believe this to be the case for PEO. While his replacement will have big shoes to fill, he has laid



Gerard McDonald, P.Eng., will become Engineers Canada CEO on February 12.

the groundwork for his successor's success. We wish him well in his new position—and look forward to his continued service to the profession."

Dony and the rest of PEO Council will work with McDonald to recommend an interim registrar for a decision by PEO's Executive Committee at its January 16 meeting, and the Human Resources Committee will begin the process for the search to hire a permanent replacement.

McDonald's last day at PEO is February 6 and he will begin work at Engineers Canada February 12.

In a December 19 statement, Engineers Canada President Russ Kinghorn, MBA, P.Eng., FEC, described McDonald as a seasoned senior executive with a proven track record of achieving strategic focus and developing collaborative relationships. One of McDonald's top priorities will be to enhance collaboration between Engineers Canada and the country's 12 engineering regulators as well as governments and other stakeholders.

PEO COMMITTEE STAGES ÉCOLE POLYTECHNIQUE MEMORIAL CEREMONY

By Michael Mastromatteo

While engineering associations, women’s advocacy groups and community leaders across the country marked the 28th anniversary of the École Polytechnique (now Polytechnique Montréal) massacre, PEO organized its own December 6 ceremony to remember the 14 victims of Canada’s deadliest mass murder.

Hosted by the regulator’s Equity and Diversity Committee, the PEO event coincided with the annual National Day of Remembrance and Action on Violence Against Women in Canada, also known as White Ribbon Day.

On December 6, 1989, lone gunman and rabid anti-feminist Marc Lépine opened fire into a class of engineering students at Montreal’s École Polytechnique. Lépine ordered the male students out of the classroom just before opening fire on the group of female students. He shot all nine women in that room, killing six. He then moved through corridors, the cafeteria and another classroom, killing a total of 14 women—all but two were engineering students—and injuring 13 others before turning the gun on himself.

In an evening presentation in the lobby of PEO headquarters, Márta Ecsedi, P.Eng., FEC, chair of PEO’s Equity and Diversity Committee—and founding chair of PEO’s Women in Engineering Advisory Committee, now part of the Ontario Society of Professional Engineers—celebrated the memory of the 14 victims and screened a short commemorative video of remembrance.

“The video you are about to see commemorates these young daughters [and] young women who will never be wives, mothers or engineers,” Ecsedi said.

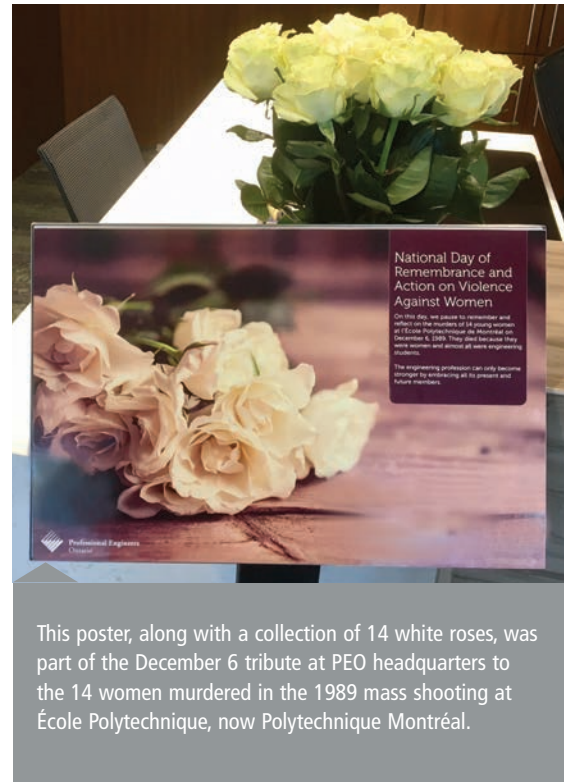
The video shows images of the 14 victims, interspaced with some of the monuments erected in their honour since 1989. It urges viewers to remember the victims and to work towards the prevention of similar incidents in the future.

Ecsedi also referred to PEO’s support of a pink granite memorial in Vancouver’s Thornton Park, which honours the memory of École Polytechnique victims.

“I had the privilege of meeting Professor Chris McDowell of Douglas College, the woman who initiated this memorial, as well as the artist, Professor Beth Alber of OCAD University [formerly the Ontario College of Art and Design], who designed it,” Ecsedi said. “When I was in Vancouver a few years ago, Chris [McDowell] took me to a florist to buy 14 roses and then to the park where I placed a rose on each bench and lit the memorial candle. It was a very touching moment for me. If you find yourself in Vancouver, I hope you will visit it.”

Earlier in the day, PEO President Bob Dony, PhD, P.Eng., FEC, called on the engineering community to reflect on the significance of the National Day of Remembrance.

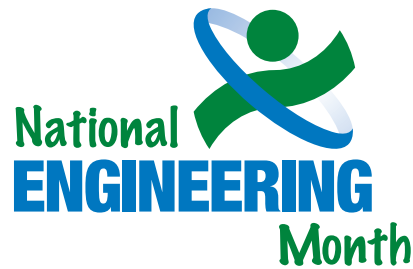
“Today we pause to mourn the loss of those 14 young women who were murdered on December 6, 1989. And we reflect to consider what actions we all can take to create a society safer for all women,” Dony said. “I’m proud to say that many in our profession are working for such change.”



This poster, along with a collection of 14 white roses, was part of the December 6 tribute at PEO headquarters to the 14 women murdered in the 1989 mass shooting at École Polytechnique, now Polytechnique Montréal.

Ecsedi said PEO’s Equity and Diversity Committee now plans to hold a National Day of Remembrance tribute at PEO every December 6. The tribute video is available for viewing at www.youtube.com/watch?v=nllsenugPlk.

2018 ONTARIO EVENT HIGHLIGHTS



National Engineering Month (NEM) is a national celebration of engineering and engineering technology that takes place in March every year. This year, Ontario is celebrating by hosting hundreds of events across the province. These events are staged by volunteers from engineering student and professional communities and are supported by members of Professional Engineers Ontario (PEO), the Ontario Association of Certified Engineering Technicians and Technologists (OACETT), the Ontario Society of Professional Engineers (OSPE), and Engineers Without Borders Canada (EWB). They engage a whole range of audiences from kindergarten students and family groups to college students and retired professionals, all with the aim of raising awareness of the contributions engineering and engineering technology make to everyday life.

You can still join in the celebrations! Reconnect with your profession and sign up to be an event volunteer and help colleagues at an event near you. You could also bring your family to an event, or follow all the action throughout the month on social media using #NEM2018 (@nemontario on Twitter and Instagram, or Facebook.com/nemontario).

The following is a partial listing of events planned and hosted by PEO chapters during NEM 2018. Please visit nemontario.ca for an up-to-date event list and further details.

BARRIE

Engineering and Technology Model-Building Competition, March 3, Eastview Secondary School

An interactive day filled with STEM-focused activities and challenges, including a bridge-building and strength-testing competition, a catapult competition, a marshmallow challenge, live engineering quiz and several demonstrations and workshops, including a Raspberry Pi computer demo, a CNC machine demo and AM radio construction.

BELLEVILLE

Bridge-Building and Airplane Propulsion Contests, March 24

Students will compete to determine the strongest bridge made from popsicle sticks that can withstand the maximum load before breakage, with resident engineers explaining how stress and strain acting on the bridges lead to failure. In the airplane propulsion competition, students are given styrofoam airplane kits and instructions on how to tweak the relevant parameters to achieve a maximum flight range—all with the aim of understanding flight mechanics. Contact: Panch Yogeswaran, P.Eng., 613-962-4386, arjyoges@hotmail.com

BRAMPTON

2018 Bridge-Building Challenge, March 3, David Suzuki Secondary School

This popsicle stick bridge-building challenge is open to students in grades 5 to 8 from the Halton-Peel and Durham regions. Teams of three students build their bridges according to the rules provided ahead of the event. They present their bridge, along with their research, design process and methodologies to a judging panel consisting of professional engineers. Bridges will be tested to failure, with students watching the results unfold live on a big screen. Prizes are awarded for

top presentations and top bridge performance (highest strength-to-weight ratio). Contact: Max Morrow, P.Eng., 905-783-1529, max.morrow@peobrampton.com

CHATHAM

Impromptu Design Competition, March 9, Chatham-Kent Secondary School

Teams of students are tasked with building an apparatus to complete a specific task using provided materials. Teams of four students from grades 7 and 8 are invited to participate in the junior division challenge, with groups of four high school students participating in the senior division.

GUELPH

8th Annual Athletics Competition, March 24, University of Guelph

Up to 70 students from grades 5 to 8 within the Grand River geographical boundary compete in this four-hour competition. Timed math questions related to engineering are pitched slightly ahead of the students' curriculum. The objective is to expose the young minds to the world of engineering and encourage them to consider becoming an engineer.

HAMILTON

Bay Area Science and Engineering Fair, March 22, Mohawk College David Braley Athletic Centre

The Bay Area Science and Engineering Fair is a competition open to all grades 7 to 12 students from Hamilton, Halton Region, Haldimand County, Norfolk County, Brant County and Six Nations. Further details are available at www.basef.ca. Contact: Robyn Korenic, P.Eng., 905-393-8910, rgkorenic@gmail.com

Engineering Book Explorers, Hamilton Public Library Central Branch

This innovation event will be hosted as part of the Hamilton Public Library

Book Explorer Event. Two or three engineering-themed stories will be presented, alongside hands-on activity stations featuring Lego, Quercetti Tech, the MakerCart and a button-making station. Live demos will explain various engineering principles, including pulleys and levels, and volunteer engineers will be available to chat with the youth and parents about engineering and the profession. The first 20 to 25 children will receive a PEO-branded tote bag containing promotional NEM material, library information, activity sheets and a copy of one of the engineering stories that were read. Contact: Robyn Korenic, P.Eng., 905-393-8910, rgkorenic@gmail.com

Youth Connect: Super Engineers, March 27, Ryerson United Church
Participants are challenged to test the superpowers of a variety of engineers—including electronic, software and mechanical—in order to escape the clutches of an evil genius! Contact: Robyn Korenic, P.Eng., 905-393-8910, rgkorenic@gmail.com

KINGSTON

18th Annual Bridge-Busting Competition, March 10
Bridges are made by students and local professionals prior to the event. They are displayed prior to the busting, and students are given the opportunity to discuss their design. Volunteers, alongside university students and professional entrants, will discuss the engineering concepts utilized in bridge-building. Prizes will be awarded to the youth entrants by age category for the strongest bridge, best overall design and best aesthetic. Lego robotics kits will be available for students to use during the event. Contact: Ashley Hosier, P.Eng., 613-453-8466, ashleymhosier@gmail.com

KITCHENER

5th Annual K'Nex Bridge-Building Competition, March 17 and 18, Kitchener Museum

Held in the lobby of the Kitchener Museum, this competition is open to all patrons, particularly children under 10 and their guardian. Children are coached by engineering student volunteers on how to build strong structures before building their own bridge out of K'Nex, which will be loaded with eight blocks of bricks. Those entries passing the load test will be entered into a raffle to win K'Nex build sets.

LONDON

GETSET 2018, March 3, Scouts Southwestern Ontario Service Centre

This annual event explores science and technology with Southwestern Ontario youth through hands-on demonstrations, experiments and competitions.

London Children's Museum Activities, March 17, London Children's Museum

Activities are still being confirmed but a button-maker will be onsite for attendees. Contact: Murray MacDonald, P.Eng., 519-859-8723, murray@mmconsulting.ca

Storytelling to Connect, Central Library

Live storytelling events give professional engineers, technologists and students a chance to connect with the public and inspire them with true stories of the incredible work they do. Contact: Matt Carson, P.Eng., 519-701-6220, mcarson@hotmail.ca

Youth Connect: Crazy Contraptions, Central Library

Participants have the opportunity to understand how things move inside a machine and how engineers design processes as they build their own crazy contraption cam toy. Contact: Matt Carson, P.Eng., 519-701-6220, mcarson@hotmail.ca

MISSISSAUGA

Bridge-Building Competition 2018, March 24, Tomken Road Middle School

Student teams are challenged to research, design and build a bridge from a supplied kit of popsicle sticks. Following a short presentation of their bridge to a panel of judges made up of engineers, team entries will be tested on a bridge-buster. Bridges will be judged based on strength, design technique, construction quality, creativity and aesthetics. Contact: Syed Saad Ali, EIT, 647-818-7325, syedsaadm.ali@peo-mc.ca

NORTH BAY

Engineering Everywhere, March 18, East Ferris Community Centre

In this workshop, participants have the opportunity to understand how things move inside a machine and how engineers design processes as they build their own crazy contraption cam toy.

13th North Bay Bridge-Building and Testing Competition, March 23, St Joseph-Scollard Hall Catholic Secondary School

This competition seeks to foster innovation by introducing and discussing the real-life technical issues faced by modern engineers in a manner that complements the curricula being taught in school. The event also allows for one-on-one interaction between students and local engineers in a casual, fun-filled atmosphere. Students from grades 4 to 12 are supplied with six, three-foot lengths of balsa wood and tasked with constructing a bridge to a set criteria. Their bridges are then tested to destruction and rated for craftsmanship, with prizes available for the winning bridges. Contact: John Simmonds, P.Eng., 705-474-4667, john.simmonds11@outlook.com

OAKVILLE

NEM-PEO Oakville Chapter Event, March 3, Holy Trinity Catholic Secondary School

A fun-filled, day-long event for students in grades 1 to 10 to discover the world of engineering! Volunteers will be showcasing multiple design demonstrations and workshops before students compete in an engineering design challenge to win prizes. Contact: Ming Hu, P.Eng., 224-307-4555, education@peo-oakvillechapter.ca

OSHAWA

13th Annual Durham Region Popsicle Stick Bridge Competition, March 24, University of Ontario Institute of Technology

Students from grades 4 to 8 across the Durham Region are invited to build popsicle stick bridges, which are then judged and tested to find the strongest bridge. Contact: Derek Van Ee, P.Eng., 416-659-2222, dvanee@gmail.com

Mathletics Event, University of Ontario Institute of Technology

This inaugural competition organized by PEO's Lake Ontario Chapter aims to create passion from the application of mathematics to solve engineering-related problems. The event will promote the engineering profession to a large group of primary and secondary school students. Contact: Fereydoon Diba, 289-600-0251, fereydoon@peolakeontario.ca

OTTAWA

Discover Engineering!, museums and malls across Ottawa

Discover Engineering! is an interactive kiosk showcasing various engineering disciplines through hands-on activities and displays. Located in public spaces, the kiosk will engage the community to discover and explore engineering. Contact: Damien Letendre, P.Eng., 613-808-6346, opeo.edu@gmail.com

PETERBOROUGH

National Engineering Month Design Challenge, March 6, Evinrude Centre

Students in grades 9 to 12 are tasked with building a small car that uses stored energy to propel itself along a track. Contact: Dan Manns, P.Eng., 705-740-5309, daniel.manns@gmail.com

SAULT STE. MARIE

Sault Ste. Marie Engineering Month Event, March 17, Sault Ste. Marie Station Mall

This annual engineering day event includes engineering displays from local businesses, a team math challenge, colouring contests, robotics displays and other exciting, interactive activities. Contact: Michael Paciocco, EIT, 705-949-1033, ext. 206, mcpaciocco@yahoo.ca

SUDBURY

Bridge-Building Competition, March 8, Dynamic Earth

This annual bridge-building competition is hosted by Dynamic Earth and open to students in grades 3 to 12. Teachers are encouraged to register their entire class, integrate the competition into their classroom lessons and make a day out of this event.

PEO Sudbury Mall Event, March 17, New Sudbury Centre

The National Engineering Month mall event is an exhibition of engineering in our society. Each year, PEO's Sudbury Chapter invites engineering companies and relevant organizations to exhibit what engineering is and how to get involved in engineering in a high-traffic area in the New Sudbury Centre. Contact: Ronny Theiss, P.Eng., 705-207-3390, ronny.theiss@gmail.com

THOUSAND ISLANDS

14th Annual Bridge-Building Competition, multiple dates, various schools

Approximately 13 schools within the Upper Canada District School Board and the Thousand Islands Chapter's boundaries will participate in half-day-long bridge-building competitions to determine which team they put forward for the regional final at the end of the month. With a trophy and other prizes up for grabs, there's more than school spirit on the line! Contact: John Ireland, P.Eng., 613-283-1788, john@irelands.ca

THUNDER BAY

Innovative Community Development, multiple dates, Lakehead University

Collaborating with local schools, the goal of this event is to support students to come up with creative solutions to problems raised in the local community. Visiting the local Intercity Shopping Centre, the team will invite the general public to share any issues or concerns they have about the community they live in and that engineering might be able to help solve. The team will break down concerns voiced by the public to create problem statements that can be easily understood and take these problem statements to a local high school where they will host a mini competition: teams of students, under the guidance of mentors, will compete to create the best solutions to the issues raised, with the winning ideas presented to the community. The volunteers will also be visiting a local elementary school to show students the workings of a trebuchet and other engineering inventions. Contact: Alex Polyak, P.Eng., 204-599-9450, opolyak@lakeheadu.ca

Mall Showcase Event, Intercity Shopping Centre

Generating interest in science and technology, this tabletop event will showcase videos and hands-on activities, including catapults, circuit boards, a Rube Goldberg machine, hydraulics and other science experiments. Contact: Phil Riegle, P.Eng., 807-624-5458, philip.riegle@tetrattech.com

Student Design Challenge, Nordmin Engineering Ltd.

Student teams are challenged with building, operating and testing a self-powered fan to blow a ping pong ball down a track as far as possible. The team that pushes the ball the farthest wins. Prizes will also be awarded for the most unique and outside-the-box designs. Contact: Phil Riegle, P.Eng., 807-624-5458, philip.riegle@tetrattech.com

TORONTO

11th Annual Engineering Idol Competition, University of Toronto

Teams of four to six students from 10 selected high schools participate in a challenging engineering task related to engineering sustainability. Using skills in design and building, this competition gives students the opportunity to create and present a solution to a sustainability challenge outlined in the launch document. It will allow them to consider creative ways of dealing with the challenges associated with GHG reduction, including sustainable energy generation and transportation.

15th Annual Popsicle Stick Bridge-Building Competition, March 4, Scarborough Civic Centre

Teams of two to three students from grades 3 to 8 participate in this popular annual bridge-building competition. Popsicle stick bridges are judged for student presentation, technical explanation, creativity,

construction quality, construction technique and aesthetics. Selected teams are invited to explain their project to the audience, outlining their process of development and construction of the bridge. Bridges are then tested to failure, with experienced engineers explaining the probable causes of failures and ways to improve. Results of the load test performance and judges' marks are projected for the audience alongside a live show of the load testing and rankings as they become available. Contact: Karthiga Thevaseelan, EIT, 647-778-3354, karthiga.thevaseelan@gmail.com

Air-Powered Drag Racer, March 10, Zion Heights Middle School

The cars designed for modern drag racing are marvels of engineering. Engines are designed to deliver maximum power output, while still needing to be lightweight. The bodies need to be extremely aerodynamic, while still protecting the driver in case of an accident. In this event, participants will design and build a drag racer to compete against other teams' designs. The design requirements, limitations and materials will be provided at the start of the challenge.

Engineering Design Challenge, March 22, Sir William Mulock Secondary School

Teams of four students from grades 7 and 8 are challenged with designing and building an object based on specific requirements, limitations and materials provided at the start of the event. Designs will be judged in three categories: problem solving and design, construction and performance evaluation. Contact: Daniel Cho, EIT, 519-721-1258, daniel.cho@peoyork.com

National Engineering Month STEM Event, S. Walter Stewart Library

Fifty grade-school students and their parents are invited to participate in this hands-on session to learn about electronics circuits by building individual electronics projects using Snap Circuits electronics kits. Volunteers will also be showcasing what engineering is, what it means to be an engineer and the value of continuing STEM in school. Contact: Michael Martin, P.Eng., 647-786-2318, michael.p.w.martin@gmail.com

WATERLOO

FIRST Robotics Participation, University of Waterloo

Grand River Chapter volunteers will be on hand at this robotics competition to promote National Engineering Month messaging and talk about the profession and what type of careers exist in technology and engineering.

WINDSOR

Innovation Station: Engineering Your Life 2018, March 3, St. Clair College

In addition to technology tours around the St. Clair College laboratories, students will have the opportunity to win prizes in a popsicle stick bridge-building competition, build race cars, try their hand at various science activities, play games on an enlarged chess board and check out the FIRST robotics Canada teams with their robots!

BECAUSE IT'S 2018!

By Jeannette Chau, P.Eng.

When Prime Minister Justin Trudeau formed his first cabinet after winning the 2015 federal election, it was composed of 50 per cent women. When asked why he wanted a cabinet with gender parity, he simply said, "Because it's 2015."

Given that the population is more than 50 per cent women, it only seems right that there should be an equal percentage of women in political positions representing us.

By 2015, with all the talk of equality, fairness and the understanding that women are equally capable, there is no reason not to have a cabinet that is composed of an equal proportion of women. Three years later, we can see women have performed their jobs as well as their male counterparts.

Though this was a breakthrough for women in politics, the unfortunate reality is there are still barriers to women in politics. The last elections saw only 35.5 per cent elected provincially and 26 per cent federally. According to the Inter-Parliamentary Union, an international organization of parliaments, Canada ranks 50 out of 190 countries on proportion of national-level female politicians.

DIVERSITY IN POLITICS

Bringing this concept of diversity of thought and opinion, and looking at it on a different level, we can see that not only is it important to have more women in politics, but more engineers in politics as well. Unfortunately, the statistics on this are extremely poor compared to other professions.

Provincially, out of 107 MPPs elected, only two are engineers, both of whom are male: Jack MacLaren, P.Eng. (MPP, Carleton-Mississippi Mills), and Jim McDonnell, P.Eng. (MPP, Stormont-Dundas-South Glengarry).

Federally, out of the 307 MPs elected, only six are engineers: Omar Alghabra, P.Eng. (MP, Mississauga Centre, Ontario), Hon. Marc Garneau, P.Eng. (MP, Notre-Dame-de-Grâce-Westmount, Quebec), Hon. Steve Blaney, P.Eng. (MP, Bellechasse-Les Etchemins-Lévis, Quebec), Sukh Dhaliwal, P.Eng. (MP, Surrey-Newton, British Columbia), and Nick Whalen, P.Eng. (MP, St John's East, Newfoundland and Labrador).

In 2015, history was made when Marilyn Gladu, P.Eng. (MP, Sarnia-Lambton), became the first female engineer to be elected federally. A female engineer has yet to be elected at the provincial level.



Marilyn Gladu, P.Eng. (MP, Sarnia-Lambton), made history when she became the first federally-elected female engineer.

Ontario and Canada need more engineers, male and female, to get involved with public policy.

Engineers and politicians are problem solvers, they understand that every action is part of a larger whole, and both must put the public good ahead of all else. Additionally, politicians are being asked to deal with highly complex issues—more now than ever before.

MPP Jim McDonnell recently stated: "It is important that more engineers get elected because so many of the issues that we (MPPs) are dealing with right now have to do with science and technology."

Engineers have an analytical mindset, which helps in evaluating complex proposals. Plus, in a 2009 study by Angus Reid, engineers ranked seventh in a list of professionals whom Canadians trust the most—politicians ranked 24th out of 25.

As we head into the 2018 provincial elections, it is hoped more engineers will step up to the plate and get elected.

Because it is 2018. **e**

[Jeannette Chau, P.Eng., is PEO's manager, government liaison programs.](#)

If you are, or you know of, an engineer who has become a nominated candidate to run in the 2018 provincial elections, email PEO Manager of Government Liaison Programs Jeannette Chau, P.Eng., at jchau@peo.on.ca to let her know. We plan to profile all engineers running in the next provincial election in a future issue.

WHEN IT COMES TO GENDER, WE MAY HAVE SOMETHING TO TEACH

The now-viral #MeToo social media campaign has allowed brave women around the world to share their stories of sexual harassment, and prompted Betsy Agar, P.Eng., to reflect on her experiences in engineering, which she says make her grateful for the supportive men she worked with.

By Betsy Agar, P.Eng.

Sexual harassment is a condition apparently plaguing the film industry, the military, the police, the legal community—the list is growing as fast as media can report cases. Given the relative dearth of women in engineering, I'm left wondering whether this male-dominated industry is likely to join this hall of shame.

To me, the answer is not obvious.

Throughout my undergrad and master's studies and in practice, I was somehow sheltered from the types of interactions struggling actresses and naïve cops faced, particularly while establishing their careers.

Here I would love to name names of the bosses, colleagues and mentors—particularly at Peto MacCallum Ltd.—who only ever showed me respect and support, who treated me equitably and looked to me for guidance on identifying and addressing potential challenges I might face as a woman. Their minds were open and they were ready to help.

Don't get me wrong, it wasn't perfect but with my mentors and colleagues I felt empowered to point out biases and to shape needed change. My vulnerability to assault was only apparent to me when I was onsite. One particular event stands out.

I was managing the wall assembly inspection of a building conversion from a local high school to condos. After grinding through so many new builds, I was excited to finally be part of a retrofit project—rehabilitation of existing buildings was what attracted me to building science in the first place—and there was this really chatty carpenter I enjoyed bantering with while I was onsite. It was a project I looked forward to.

On my last day he hugged me.

He stood about six feet five inches and I was suddenly overcome with the realization that we were isolated in a part of the building where no one else had cause to enter and with only one way out. I left immediately, hoping I had documented the inspection properly, and relieved I would not see him again.

Whether that hug was as threatening as it felt I will thankfully never know, but what became abundantly clear to me is that the vast majority of men would never find themselves

in that situation. He had crossed a very clear professional line yet I was the one who felt vulnerable and somehow ashamed. He has likely never thought twice about it.

I told no one. I worried I would be kept off certain jobs because I am a woman, or worse, that they would think it was no big deal and that I was being silly to worry. I can read the words I am writing and think exactly that but when I close my eyes and return to that day, my sense of panic rushes in.

Other contractors made assumptions about me too, like that I was one of the "girls in the front office," but my male colleague—they were all male—corrected that misperception before I could even form a response. More often, though, contractors carried on rich conversations with me about the elegance of architectural features being lost as masons were being pushed into engineered masonry or about the toll that installing tar and gravel roofing takes on a person's mind and body.

While I did not emerge unscathed, the majority of my experiences were positive, particularly when it came to my colleagues. They welcomed my ideas and trusted that if I showed up at the office wearing a skirt I would have coveralls to slip over my clothes. My #MeToo story has made me grateful for the men I worked with.

I have not practised since having kids 15 years ago, which is why I am feeling particularly reflective about my time in engineering. Since leaving, I have ironically had more experiences that emphasized my gender than I had while practising—from men and women. What is surprising is that these have been at their worst in the not-for-profit, social entrepreneurial world—a world I blindly expected would be more enlightened and equitable.

I can only assume that the effect of being a self-regulated, male-dominated field is that the engineering approach to supporting women must be more robust and deliberate—even if flawed—than is possible among other professions.

There will be women reading this who have suffered in ways I have not and it is not my intention to dismiss their experiences. My idealist hope is that the engineering profession has been considering how to be more inviting to women for so long that while we may not be making headway statistically, perhaps we are ahead in professionalism, especially in terms of sexual harassment.

Regardless, it is worth opening the dialogue preemptively, both to uncover aspects of the engineering culture that we may need to change and to make sure we are all on the same page about how equitable, respectful work environments should look and feel—namely safe and empowering. Maybe mine is a uniquely positive experience—let's find out. We may discover we have more to teach than the story our numbers are telling us. [e](#)

[Betsy Agar, P.Eng.](#), is a PEO member now living in British Columbia. She works on accelerating renewable energy and energy efficiency towards achieving a low-carbon and just economy.

LIFE AFTER CHARBONNEAU

By Steven Haddock

The past few years have seen a crisis in the civil engineering profession in Quebec: Engineers and engineering firms in the province were caught up in the wider web of collusion and corruption involving municipal and provincial construction projects. While the engineering profession certainly didn't shoulder all or even the majority of the blame, unraveling the systematic problems will likely not be completed for years to come.

This, in a nutshell, was the conclusion of the Charbonneau Commission in Quebec. Established by the Quebec government in 2011 to investigate systemic problems in awarding government civil construction contracts, its scope slowly grew into a rat's nest as problematic practices were discovered even after the commission started its work. In total, the commission made 60 recommendations covering procurement, political influence, citizen participation and confidence in public officials.

As such, engineers should probably be asking themselves a similar question to the one the American Bar Association (ABA) addressed after the Watergate scandal in the mid-1970s: How could so many professionals (in that case, lawyers) systematically ignore their ethical obligations and the law? What had gone so wrong with the legal profession that led the president of the United States and his most senior advisors—all lawyers—to conspire to obstruct justice? The ABA's answer was that it was likely the way ethics was framed to that point. Ethical rules put too little emphasis on obeying the law and respecting the courts and too much on the interests of clients and deference to other lawyers. Ever since, the ABA has been working on its model Code of Ethics to address what should have been obvious: Lawyers must respect the law.

Luckily, it appears the damage to the reputation of the engineering profession by the Charbonneau crisis was limited by both geography and the area of practice. However, it appears that, in a similar fashion, when confronted with novel applications of the engineering Code of Ethics, engineers from the most senior members of international engineering firms down to engineering interns failed to do the right thing. Those who did do the right thing soon found themselves on the outside looking in.

Among the issues the Charbonneau Commission determined to be widespread in the civil engineering sector, were:

- Routine padding of per unit quantities in contracts to pay for unauthorized extras;
- Hiring of former municipal politicians to do "business development";
- Financing and organizing of municipal political campaigns, then having the candidates they supported pick the committee members who made the decision to award municipal contracts;
- Preparation of tenders with "true" quantities of unit items to preferred bidders and exaggerated quantities to other bidders, thus allowing preferred bidders to submit far lower bids based on the likely amounts;
- Preparation of selection criteria for engineering services that were deliberately weighted to the engineering firm preparing the criteria, or to another preferred firm;
- Urging of employees to contribute the maximum amount to municipal and provincial political candidates, then reimbursing them for the contribution to get around Quebec's strict laws prohibiting corporate donations;
- Working with contractors who were clearly attached to organized crime. This included efforts to muscle out competitors by making it clear that there would be consequences for trying to break into a restricted market (equipment sabotage was common and personal threats were not unknown);
- Emphasis on tendering out every engineering contract instead of allowing for broader selection criteria—this practice was exacerbated by governments insisting on paying a "flat rate" instead of an hourly rate for things like general review;
- Lack of government oversight due to attrition of both engineers and auditors in the public sector. This allowed engineers and contractors to routinely overcharge and to charge for work that wasn't actually performed; and
- An increased demand for political contributions, which put pressure on engineering and construction firms that were largely dependent on government contracts.

LESSONS LEARNED

One of the other key factors was the inability of Quebec's engineering regulator, the Ordre des ingénieurs du Québec (OIQ), to deal with the sheer volume of complaints. Prior to 2010, OIQ received a handful of corruption complaints a year. After that, they routinely received well over 100 per year, and many of those complaints related to actions that actually took place before 2010.

So what lessons can be learned from what happened in the civil engineering profession in Quebec? Certainly, if there is a similar situation in the future, there are a lot more safeguards in place. After a temporary period of guardianship, OIQ is demanding more of its members and is better prepared to handle complaints.

But a better question is how this sort of behaviour not only became commonplace, but normal—not merely widespread, but pervasive. The widespread corruption and collusion didn't happen overnight—neither was the problem caused by newly minted professionals who didn't know any better.



Some of the key issues contributing to the problem that came out of the Charbonneau inquiry were:

1. **Decision-making:** Unlike Ontario, OIQ does not have a certificate of authorization requirement or any authority over engineering firms. In many cases, the decisions to engage in corrupt practices were made by non-engineers who recruited other non-engineers (politicians and contractors) into corrupt and collusive schemes;
2. **Selection processes:** There was very little isolation between politicians and engineering firms. Politicians, not civil servants, were usually in charge of selection processes, and political interference in the selection process was common. Work was routinely given to political allies and denied to political rivals. Politicians became dependent on engineers for contributions, and engineers became dependent on politicians for work;
3. **Cost cutting:** To save on personnel costs, professional engineers working for governments were routinely removed from the design process and were almost completely assigned to project management. This made governments more dependent on consultants and, at the same time, removed the expertise they needed to properly assess the proposals made by those consultants. Any savings from slimming staff were quickly gobbled up by the consultants; and
4. **Financing:** Government payment and approval processes were glacial. This led to cash flow problems in both the engineering and construction sectors. Engineering and construction firms would routinely bill out in a timely manner, only to wait for months to be paid. In many cases these firms would have to turn to questionable sources of financing, including those with ties to criminal organizations who used this leverage to get a larger share of business.

But in the end, the commission noted that many of these practices were normalized within the profession. When called upon to give testimony, many engineers and

contractors tried to pass off what they were doing as a good thing. A contractor who described himself as “small” despite doing more than \$100 million in municipal business per year, said collusion was a matter of “survival” and “respect for competitors.” Firms that illegally participated in campaign financing and organization called the work “democratic participation.”

In the end, it begs the question: Are engineers trained to prepare themselves for the ethical challenges they are likely to face once they get into practice? While engineers know enough about ethics to pass an exam, ethics, like engineering, is in a constant state of flux. Our understanding of both engineering and ethics change as old problems are solved, improvements are found and new challenges arise. This can be seen in the development of Ontario’s definition of “professional misconduct.” Although it was a recent development based on an isolated discipline case—and the engineer was punished nonetheless—it was only within the last 20 years that “harassment” became part of the definition of professional misconduct in Ontario. One would hope that engineers wouldn’t engage in discreditable conduct merely because it isn’t specifically prohibited in s. 72(2) of the regulations. But if Charbonneau teaches us anything, it’s that people wanting to act in an unethical manner can be just as innovative as anyone else.

EMPHASIS ON ETHICS

This is particularly true of the various schemes to finance campaigns. As an enforcement officer, I have dealt with a few of the OIQ members who were caught up in those schemes. Rarely did they question the request to contribute to a campaign, nor did they find it strange when they received a bonus equal to their contribution. When confronted, they argued that although the scheme may have violated the spirit of the law, it didn’t precisely violate the letter of the law. In addition, they tended to see corruption only as a *quid pro quo* arrangement and felt that if the firm didn’t get an immediate benefit, there was no corruption involved. Lastly, they argued that, despite all of this, the conduct clearly wasn’t discreditable, disgraceful or unprofessional. OIQ disagreed and over 150 members caught up in such schemes reached a plea agreement.

Deciding how much emphasis universities and professional regulators should put on ethics in the future will be problematic. PEO has already made it a focus in its Practice Evaluation and Knowledge (PEAK) program where a refresher course in ethics is at the top of the list for all members. Certainly, there will continue to be cases of individual practitioners acting unethically. However, whether particular ethical problems arise again in the profession as a whole will largely be the result of how educators and the profession react to such transgressions when they arise. **e**

[Steven Haddock is an enforcement officer at PEO.](#)

RALLYING TO



CHANGE THE RATIO

Despite decades of effort to encourage more girls to consider technical careers, less than 13 per cent of practising professional engineers in Canada are women, many of whom still face questions about whether they fit in. Despite the odds, these women are more determined than ever to become part of a greater network of engineers who rally to support each other.

BY NATALYA ANDERSON

While progress in the area of gender equality can feel heavy-footed, women in engineering are not only radically changing the conversation surrounding what it means to be female in a male-dominated industry, they're changing the very language that makes up the conversation.

At different ages, stages and cultural perspectives in their careers, many women in engineering have faced discrimination and are contributing to systemic change through education, strength, initiative, innovation and palpable optimism. Reversing patterns in the culture of education, thereby encouraging more young girls to consider engineering for their future, remains a focal point for women in the industry today.

Cassondra Fonseca, P.Eng., who is in her late-20s and in the first seven years of her career, says there has been a sense of isolation since her university days, where she was one of less than a handful of women in her program. Being treated differently crossed over into her first years on the job. "I was a minority in every sense," says Fonseca, a project engineer at Hydro One. "I was born in Canada but I'm of Indian descent, so I was a visible minority. Initially, I felt the challenge. If I was in a meeting and it was a group of men, and then just me, I would be asked to be the minute-taker,

or I was assigned extra administrative tasks on top of my design work."

The sense of intimidation and exclusion is echoed by Amma Wakefield, P.Eng., who, in her mid-30s and beginning her second decade in the field, has fought to be considered part of the male-dominated team. "I don't make it a point to have it on my mind that I'm a black female in a Caucasian male-dominated industry," says Wakefield, manager of quality for design-build projects at Aecon Materials Engineering (Aecon Group Inc.). "However, there are things that will happen where you are sort of, 'Oh, right, it's because I'm a woman... I'm a black woman,' especially in construction."

Wakefield says she has, at times, found client-networking activities to have been male-centric, even after being promoted. "There was one company I was employed with, and they had a golf tournament every year in the middle of the summer in order to interact with clients and build a relationship with them," explains Wakefield. "The man who was in my role prior to me went to that golf tournament every single year. The year he moved on to be project manager and I took his role, I saw the registration for the golf tournament and I thought, 'Oh, this is great! I get to

Cassandra Fonseca, P.Eng., concentrates her efforts on supporting women engineers at Hydro One. Photo: Hydro One



go meet new clients and make connections.’ But the golf tournament came and went. The project manager who used to go still went. It really bothered me. I finally got up the courage and went to our general manager... I had to be brave. At that point I was in his office, and I had to know what it was I had to do to get the privileges that the same person who previously held my same exact position had. My general manager didn’t have any answers for me. He stormed out of his own office. Needless to say, I never missed that golf tournament after that. I went every single year.”

Small victories like Wakefield’s are part of a system in which there haven’t been enough women employed to support the kind of discourse needed to spark change in team-building exercises. For Mary Wells, PhD, P.Eng., now in her 50s and having worked for 30 years as an engineer at various levels, a visible transformation is happening but a collective effort is still needed.

“I graduated 30 years ago,” says Wells, dean of the College of Engineering and Physical Sciences at the University of Guelph, and chair of the Ontario Network of Women in Engineering (ONWiE). “At the time, I was a teenager; there was really no outreach. There was a very low percentage of women who were studying engineering. There was around 13 per cent of women who were graduating in engineering. In the profession itself, it was about three per cent women. There were not a lot of role models. When I graduated I worked in the steel industry—so, again, very few women at the time. I felt like a bit of an anomaly. They didn’t really know what to expect. They had very little exposure to technical women who would be working alongside them. I would say I was a curiosity. They would very quickly look at me as almost a daughter. They would say to me, ‘Oh, let me help you carry that.’”

Over time, all three women say they’ve learned to alter their behaviour in accordance with their environment. “Rotating through different areas allowed me to analyze the situation,” explains Fonseca. “I would treat a field environment differently than a head office environment. Understanding different people, different backgrounds, different [male employees], I learned how to modify my personality. Being female, and being onsite, I notice that you’re treated differently. Men tend to listen to each other. You really have to prove yourself before they listen to you. Once you can prove to them that you know what you’re talking about—that you’re technically sound—then they have more of an open ear.”

Fonseca, Wakefield and Wells all suggest that learning how to trade an emotional response for a practical application in problem solving is part of surviving. Additionally, Wakefield stresses the importance of including men who are supportive and empowering of women.

“I have had the opportunity to meet brilliant men who have a different level of intelligence,” Wakefield says. “Those are the ones I lean on for guidance.”

“When you’re a young person, you adapt to the environment to fit in,” adds Wells. “There were definitely things going on that, at first, seemed very strange to me. In my limited view of what it meant to be an engineer I felt this was part of it. So, you were forever changed by those experiences. Years later, when other women have said, ‘That’s horrible [men] said these things to you,’ I say, ‘Well, it’s not that bad.’ I had changed and adapted because I had survived the system. You lose your own perspective.”

CREATING A NETWORK

Remarkably, all three women are part of a greater network of engineers who are rallying to support each other. Whether involved in groups within their respective companies—Fonseca even created a group with a colleague at Hydro One to fill a gap for women there—or becoming involved in larger efforts like ONWiE, female employees are teaching each other how to not simply survive a male-dominated system but how to evolve and reshape the system itself.

“It’s about communication,” explains Fonseca, who supported a female colleague in creating the Women in Trades Technology and Engineering Network at Hydro One. “Have some notes. Have a clear indication of what you want to say. And if you don’t know, don’t be afraid to say that you don’t know. I was always afraid to say that. I read a [Hewlett Packard internal study, which was referenced by *Forbes* and by *Harvard Business Review*] that said that if females don’t know 100 per cent of the qualifications of what they’re



Amma Wakefield, P.Eng., aims to be progressive and optimistic in her job at Aecon Group Inc.
Photo: Canan Hosseyeni

interviewing for, they won't apply, whereas men will apply if they have 60 per cent to 80 per cent knowledge. Also, if you know you're right, you have to speak up. You might have to cut people off sometimes. Women might be apologetic. We might think, 'He's male. He's been here for 20 years. I'm afraid to give my opinion on this technical matter.'"

Showing encouragement to other women outside of the office is also essential to making progress. "Whenever I've met any female engineer—at my level, or younger or older—it's always been very positive," adds Wakefield, who also takes part in seminars and accesses resources through the Canadian Association of Women in Construction. "And we all talk about these same issues."

Perhaps most effective is the application of outreach programs through ONWiE that has steadily come into play since its founding in 2005. The network's first national outreach program, Go ENG Girl, was awarded the 2016 Natural Sciences and Engineering Research Council of Canada Awards for Science Promotion. And the award comes none too soon, as the most recent statistics from the

National Council of Deans of Engineering and Applied Science annual resources survey, as well as the enrolment reports prepared by Engineers Canada, indicate that the percentage of women studying engineering in accredited programs across Canada hovers at between 19 and 20 per cent. This percentage did not increase significantly between 2001 and 2015.

"About 12 years ago, all of the faculties of applied science and engineering in Ontario got together, put their competitions aside and [wanted to make changes] for diversity in engineering and women in engineering," explains Wells. "That was a huge deal at the time, for them to come together like that. Nobody else was really doing it. Out of that came Go ENG Girl. The elements that have made Go ENG Girl so successful are, firstly, that all the schools and faculties of applied sciences across Ontario and across Canada are offering it. Secondly, it engages not only the girls at a critical time in their lives—grades 7 to 10 as they're entering high school and starting to make decisions about courses that will allow them to apply to engineering—but it also engages the parents. The third aspect is that we bring them into the universities so they get to meet role models—young women engineers who aren't that much older than them who are doing amazing things. It's a kind of peer mentoring. A young girl might say, 'Wow, she's really great. I want to be like her.'"

NATIONAL EFFORTS

The precedent set by ONWiE and Go ENG Girl targets the crucial element needed to achieve gender equality across the industry as a whole—understanding the psychology of children as they approach ideas and problem solving at a young age. The idea that girls are not good at math or science, or that girls should be afraid of these subjects, has been the impetus for a new series of projects for which Wells is a founding team member. Engendering Success in STEM (science, technology, engineering and math) is a national research consortium that aims to change both male and female mindsets at different points in an education system and workplace that suggest girls are not good at STEM, but boys are considered good at coding or problem solving.

"What really excites me is the partnership with the social psychologists," says Wells. "We can't do it by ourselves. [In the school system] there can be lot of subtle or overt criticism, to the point where girls start to doubt themselves."

In seeking to reverse this, the STEM team members will launch projects to foster innovation and create gender equality. To reverse what they describe as a "think science, think male" belief, they will conduct research to test "the long-term efficacy of interventions that harness the power of positive social interactions to mitigate subtle gender bias." They hope to combat cultural biases that exclude girls from education paths that could lead them to success and fulfilment in STEM careers.

"I am part of it as a STEM expert but it is the partnership between social science researchers and engineering professionals that is very exciting," explains Wells. "This will be a game changer."

Last August, the Ontario Society of Professional Engineers (OSPE) received funding of \$385,000 from the Status of Women Canada for its 36-month-long project, Canada 150 STEM Challenge, which also



Mary Wells, PhD, P.Eng., is seen working with students at her previous position with the University of Waterloo. Photo: University of Waterloo

addresses systemic barriers for women choosing STEM careers. OSPE, PEO, the Ontario Association of Certified Engineering Technicians and Technologists and other partners are working with students, schools, employers, governments, parents and stakeholders to develop strategies to remove systemic barriers using online tools designed to support women and girls, and create and promote workplace and government policy recommendations.

Similarly, Engineers Canada is leading a “30 by 30” initiative, which has a goal of raising the percentage of newly licensed engineers who are women to 30 per cent by the year 2030—since 30 per cent is considered the tipping point for sustainable change. Currently in Ontario, only 15 per cent of newly licensed engineers are female. The initiative has received national support from across all provinces and territories, including PEO and OSPE (see p. 6).

Given that so many of these new projects are still in their infancy, local efforts by women within their companies are still of huge importance. ONWiE, in seeking to inform employers of how to change gender-bias language in the workplace, offers extensive resources on their website to guide work environments towards inclusive, non-biased communication (www.onwie.ca/resources-tools/gender-diversity-101). Fonseca and Wakefield are both concentrating their efforts on supporting young women at work and showing them how engineering can be applied in activities they might not have considered. Fonseca has

laid the ground work for a spring camp for girls to engage in outdoor activities that involve feats of engineering.

“Girls aren’t initially interested until we do hands-on activities,” explains Fonseca. “If you don’t like math when you’re younger, you just don’t like math and science. You have a skewed perception of math and science. I try to teach them that an engineer is not just math, science and physics. It’s also a dancer, a soccer player, someone who’s involved in the community who has fun, someone who’s not a male in an engineering outfit with a hard hat. I try to shine a positive light... I don’t want young girls to feel cheated.” **e**



REACHING 30 by 30

While encouraging more women to join the engineering profession seems like a tall order, the clinical engineering field is a good place to start. The Children’s Hospital of Eastern Ontario–Ottawa Children’s Treatment Centre showcases the roles women engineers play within clinical engineering and elsewhere in the organization. **By MARIE-ANGE JANVIER, PHD, P.ENG., MONIQUE FRIZE, PHD, P.ENG., FEC, and KIM GREENWOOD, P.ENG.**



Catherine Delude, P.Eng. (far right), is seen working in a nursing simulation lab at CHEO-OCTC.

It has always been a challenge to have an equal representation of women in an engineering workplace, but this hasn’t been the case at the Children’s Hospital of Eastern Ontario–Ottawa Children’s Treatment Centre (CHEO-OCTC), where you’ll find many women working in engineering. They are found in various roles covering a wide spectrum of responsibilities in a university teaching hospital environment. Inspired by Engineers Canada’s goal of raising the percentage of newly licensed engineers who are women to 30 per cent by the year 2030—otherwise known as “30 by 30”—CHEO-OCTC is well-positioned to have 30 per cent of its female engineering graduates licensed by 2030.

Over the past 20 years, there has been a small but noticeable increase in females graduating in engineering from Canadian colleges and universities, although the uptake rate of female graduates varies from industry to industry. In CHEO-OCTC’s clinical engineering department, led by Kim Greenwood, P.Eng., there is close to 30 per cent representation of women working in different aspects of engineering, and currently seven per cent are P.Engs. Back in the 1990s, Greenwood recognized there was a void in females holding engineering or technology positions in this workplace, so he made a conscious effort to change this situation.

“Early in my career, in the 1980s, I realized that many organizations systematically discriminated against the hiring of females and people of colour,” says Greenwood. “This really bothered me. When given the opportunity to hire, I made sure the process was fair—the best person for the job was hired regardless of who they are. Our organization has benefited from a diverse workplace.”

LEADING ROLES

The current clinical engineering department at CHEO-OCTC of 32 staff has nine positions held by women. Among them, five are working as biomedical engineering technologists. Their role is to provide technology support not only to CHEO-OCTC’s 168 beds but to 18 other independent healthcare facilities at 23 sites, totaling more than 2100 patient beds.

Currently, there are three women—Rachel Zhang, EIT, Parisa Bahrami, P.Eng., and Marie-Ange Janvier, PhD, P.Eng.—who are leading the

implementation of all-new healthcare technology at CHEO-OCTC, which regularly involves large diverse interdisciplinary teams. Projects range from managing large and complex magnetic resonance imaging equipment to infusion pumps; performing the technology-planning process; and the research and evaluation of available equipment that matches the clinical, technical and financial needs of the hospital. Clinical engineers also coordinate clinical assessments by doing appropriate validation testing with stakeholders (e.g. nurses and physicians), and once the equipment is selected they plan the integration of medical equipment into the hospital.

Beyond the clinical engineers and biomedical engineering technologist positions at CHEO-OCTC, female engineers also work in the facilities management, information system and information services departments of the hospital. One female engineer, Gaetanne Heggie, P.Eng., extends her clinical engineering skills to the facility management and planning department. Her work involves planning, organizing and coordinating diverse projects, which vary from infrastructure renewal to operation and maintenance. She also coordinates policy development. "I believe my engineering background has helped me develop a systematic approach to my work," says Heggie. "Coupling my technical knowledge with my clinical experience allows me to better understand the needs of the hospital and integrate people with the space and the infrastructure."

In the information system department, Abiola Ogungbemile, EIT, works as a business systems analyst. Her responsibilities entail the management of daily operations and maintenance of the laboratory information system (LIS). This involves ensuring connectivity between laboratory instruments/equipment and the LIS; interfacing with other LIS and integrating with the electronic medical record. The core of this role is supporting user experience to navigate the LIS by ensuring the tools necessary for operation are available and processes are streamlined. "My engineering background provides



The women who work in engineering at CHEO-OCTC are (left to right): Vanessa Flores, Marie-Ange Janvier, PhD, P.Eng., Rifat Syed, Aimee Riggs-Willey, Catherine Dulude, P.Eng., Gaetanne Heggie, P.Eng., Abiola Ogungbemile, EIT, Mari Teitelbaum, Beth Cole, Dana Andersen and Rachel Zhang, EIT.

the guiding principles to my approach towards system requirements gathering, building, optimization and testing while keeping patient safety at the forefront of these decisions," explains Ogungbemile.

Catherine Dulude, P.Eng., who has an industrial engineering degree from the University of Toronto and a master of design from Carleton University, is a human-factors engineer in CHEO-OCTC's information services department. She works with clinicians and interdisciplinary teams across departments to identify user and workflow requirements, environmental and technical capabilities and limitations and design solutions that will support future workflows. Most recently, she led the assessment and redesign of clinical spaces, including selection and placement of computer hardware and ergonomic accessories, as the hospital transitioned from paper to an integrated electronic medical record (EMR) system. "My engineering training and experience help me identify which methods best suit a project's desired outcome and navigate sometimes conflicting human, technical and organizational factors," says Dulude. "In preparation for the transition from hybrid electronic/paper charting to an integrated EMR, we took a human-centred approach and used simulation with clinical end-users and anticipated future electronic workflows to test identified hardware options and space design solutions."

The information services department is led by a graduate of the electrical engineering program at Queens University, Mari Teitelbaum, who began her career in the high-tech sector. She shifted into healthcare by completing a master of health administration at the University of Ottawa. She is now the chief information officer (CIO) and vice president of provincial programs at CHEO-OCTC. In her CIO role, Teitelbaum is responsible for the software applications across the hospital, from the leading-edge electronic patient record system to the finance and payroll systems. She supports a staff of about 50 people, who ensure software systems meet the needs of users and remain current and stable.

CHEO-OCTC is leading the way in showing that it is possible to create more gender balance in the engineering workplace without having to impose rigid hiring practices. As a place of employment, it is well on its way to reach its own 30 by 30 goal and increase the representation of women in engineering disciplines as more women continue to enter the profession and choose to work in a hospital environment. **e**





OUTSTANDING FEMALE ENGINEERS



How the engineering profession can increase the representation of women is a well-documented dilemma, but it only tells part of the story. There are women in Ontario and elsewhere who are already leading engineering teams at important companies, building cutting-edge technologies at start-ups, and adding value to community projects. As outlined in the lives and work experience of the 25 professional engineers featured here, women professionals are making their mark.

By Michael Mastromatteo

JENNIFER AHLUWALIA, P.ENG.

Executive director, clients, Dillon Consulting Ltd.



Ahluwalia joined Dillon Consulting in 2010 as the lead for the environmental management and atmospheric services practice. Primarily a private sector discipline area, her role involved developing new client relationships and growing existing ones to keep pace with new policy direction associated with air quality management, climate change and waste management.

At her time with Dillon, she has worked on many significant projects, including supporting the provincial government in the areas of modernization of approvals, technical aspects of the cap and trade program, and assisting the waste management sector with opportunities related to environmental compliance and organics processing. Her openness to new ideas, new people and new philosophies and her ability to build strong connections and influence others has enabled her to progress to her current leadership position at Dillon. She joined Dillon's newly created executive team in 2015.

"Two years after joining Dillon, I was appointed to be a partner in the firm and on my return from a maternity leave was given the opportunity to serve on the board of directors," Ahluwalia says. "In 2015, I became the executive director, clients, for Dillon where my responsibilities include overseeing the quantity and quality of our revenue across the country. I play an important role supporting the CEO in the development of our key strategic plan for sustainable growth."

STEPHANIE ALTMAN, P.ENG.

Project manager, capital projects, Massey Hall/Roy Thomson Hall Corporation

As a civil engineering graduate with expertise in structural design and construction, Altman can now claim a career in the theatre—in a manner of speaking. Since early 2017, she has been responsible for capital projects at two of Toronto, Ontario's best-known performance venues: Massey Hall and Roy Thomson Hall.



"In conjunction with the director of operations, I analyze the Massey Hall/Roy Thomson Hall Corporation's multi-year capital plan and propose new construction and maintenance projects to benefit our assets as well as monitor progress of ongoing works," Altman explains. "I've been fortunate to have some strong mentors

who have supported my development as an engineer while giving me opportunities to explore various roles and instilling the confidence needed to succeed in this industry."

IMELDA ARIANI, P.ENG.

Senior radiation physicist, Candu Energy Inc.

At Candu Energy, Ariani is responsible for planning, coordinating and delivering work packages related to the radiation transports, shielding designs and radiation protection. Her expertise includes shielding designs of nuclear facilities and components, radiation damage and environment qualification assessment for reactor components, radioactive waste safety, and accident consequence assessment. She is also responsible for mentoring junior members of the radiation physics group.

"My engineering career began at North Carolina State University," Ariani explains. "I earned a bachelor's degree and a master's degree in nuclear engineering and continued on working at the university as a research associate for a few years following my study." Prior to Candu Energy, Ariani worked as a senior reactor physicist at Atomic Energy of Canada Ltd., preceded by a stint as a researcher at the Centre for Advanced Reactor Systems with the National Nuclear Energy Agency in Indonesia.



VITTORIA BELLISSIMO, P.ENG.

Executive director, Industrial Power Consumers Association of Alberta (IPCAA)



In her role at IPCAA, Bellissimo is responsible for developing the association's corporate direction and annual business plan and executing strategic goals against the plan. She also monitors real-time and forward markets, analyzes rates and tariffs, and troubleshoots for members with demand-side management, supply, rate, cost, connection and process concerns. On the com-

munications front, Bellissimo consults with all levels of government and has experience presenting, moderating and commentating at industry conferences.

"I've taken an interesting route to my current position," she says. "I served as a project manager in market structure at the Ontario Power Authority (now the Independent Electricity System Operator), and I have had roles in pro-

curement at the Ontario Ministry of Energy, renewable energy research at the Scottish Parliament, and construction IT at the University of Maribor, Slovenia.”

ANDREA COREY, P.ENG.

Vice president, product development, Nudge.ai

Nudge.ai is a start-up company in Toronto, ON with a staff approaching 20. Corey is both a leader in the company and



a hands-on software developer. Most of her career has been spent in product development at start-up technology companies that build Software-as-a-Server (SaaS) products. In a previous role, Corey led a team of 40 quality-assurance testers and developers, which was much closer to a traditional management position.

“Our product is evolving quickly, and my responsibilities include identifying new features and other non-functional changes, such as code optimizations, that will benefit our customers, producing metrics and working with others to evaluate our performance as a team, evaluating new technologies, as well as writing and testing code,” Corey explains. “I work closely with colleagues in both technical and customer-facing roles to work through new ideas and resolve issues. I also lead our diversity and inclusion initiatives at Nudge.ai to help ensure that we have the best team.”

ANGELIQUE DAVIS, P.ENG.

Naval architect, Vard Marine Inc.

A graduate of Memorial University of Newfoundland’s engineering co-op program, Davis enjoys a variety of work experience at Vard Marine. “One day I will work on structural calculations as part of a multi-phase design project, and the next I will write a report on potential future legislation and its effect on a client’s proposed vessel design. My colleagues and clients rely on me to produce a product that is of high quality, on time and on budget,” Davis says.

While there are currently no female engineers in senior management positions at the company, Davis expects to see this change in the coming years with the increased interest in science and engineering fields, as well as women taking on leadership roles. “Through my work, I have had the opportunity to participate in professional societies, attend conferences, and foster professional



relationships with female engineers who are in senior positions in other organizations,” she says. “As I continue to work and gain experience, I am confident my career will include an increase in responsibilities and advancement opportunities and I look forward to the challenges that await me.”

SAMANTHA ESLEY, P.ENG.

Director, technical excellence in mining and mineral processing, Vale Base Metals



Multi-award winner Esley is known as a trailblazer for women in the mining sector, and it’s hard to argue otherwise.

“My role as technical director of mining and mineral processing is a first for a woman at Vale,” she says. “I am proud of this achievement. I am also proud that Vale Base Metals employs many women across the organization and at all levels, from the

front lines to the senior executives, including a CEO, Jennifer Maki, and a chief financial officer, Andrea Almeida.”

Even as an engineering intern, Esley was involved in mining operations. She developed specialization in rock mechanics and the development of mining automation and new, innovative processes. In her career, she served as engineering manager of the Copper Cliff Deep Mine project, and as mine superintendent at the Creighton Mine.

Esley participates in many areas of the mining business and on boards, such as MIRARCO, Science North, Canadian Institute of Mining, Global Mining Standards and Guidelines, Women in Science and Engineering, Engineers Canada and Women in Mining. She is also the chair of the Bharti School of Engineering at Laurentian University, and was honoured to receive the Women in Mining Canada Trailblazer Award, the Award for Support of Women in the Engineering Profession from Engineers Canada, an Ontario Professional Engineers Award in the management category, and a fellowship with the Canadian Academy of Engineering.

DIANA FERRARI, P.ENG.

Director, central engineering, Creation Technologies

Creation Technologies is a provider of electronic design and manufacturing solutions headquartered in Canada and with locations in the US, Mexico and China. As a director, Ferrari leads a value analysis and value engineering (VAVE) team to reduce risk and cost of customer designs across industrial, medical, communications, transportation and



defence sectors. Ferrari is the first person in the company to take on the new role of director of central engineering.

"Our engineers analyze a customer's design and offer solutions to make the product easier to produce from a manufacturing perspective, less expensive to procure from a material cost perspective and reduce all forms of risk in the supply chain so that their products can have a successful launch and a healthy overall product life cycle," Ferrari explains.

Ferrari also leads the company's product engineering team from a strategic roadmap perspective and its environmental compliance team, which ensures it has a sustainable approach to various legislative compliance issues.

CORINNE FRANÇOISE, P.ENG.

Director, training program evaluation division, Canadian Nuclear Safety Commission (CNSC)



As a professional engineer and project management professional, Françoise has more than 18 years of experience in the nuclear industry. In her current role as director of the training program evaluation division at the CNSC, she is responsible for providing regulatory leadership and expertise pertaining to CNSC licensee training programs.

Previously, she was director of the personnel certification division at the CNSC, responsible for the certification of exposure device operators as well as personnel at nuclear reactor facilities, such as control room operators and health physicists.

"Throughout my career, building relationships based on mutual trust and maintaining a high level of professionalism under ever-changing conditions have been key in reaching any sort of successful outcome," Françoise says. "In my estimation, strong performance on the job leads to earning the respect of your peers and co-workers, which in turn allows for a more seamless integration into any work environment, irrespective of your gender, cultural background or other characteristic."

JENNY FRANKEL, P.ENG.

CEO and founder, Nudestix Inc.

A 1994 graduate of chemical engineering from the University of Toronto, Frankel first joined MAC cosmetics as a product developer and process engineer. As a new product development specialist, Frankel oversaw successful product launches by way of tactical planning, branding expertise and



packaging, marketing and distribution initiatives. In 2000, she helped create a beauty brand called COVER FX, and in 2014 she went on to create her own beauty brand, Nudestix Inc. "I was able to identify 'white space,' and lack of innovation in the global beauty industry and engineer new brand concepts to meet customer demands," Frankel explains. "Engineering inspires a problem-solving approach to life, and this is the essence of any entrepreneur. For any engineer and entrepreneur, adversity and challenges are commonplace, and to be successful, you need to think strategically about how to make it work. There is always a solution to be engineered. The same is true with launching a global beauty business."

ALICIA FRASER, P.ENG.

Vice president, engineering, capital and support, Ontario Clean Water Agency (OCWA)

The OCWA is a provincial group providing water and wastewater operations for municipalities, First Nations and



industrial partners. As a vice president, Fraser oversees engineering, project management, process optimization, asset management, technological and innovation services, and health, safety and environmental compliance.

She started her career consulting in both the water resources and drinking water treatment sector, and over time shifted her focus

from design to construction and project management. She worked for the City of Toronto in 2010 and managed the city's Basement Flooding Protection Subsidy Program and played a part in the project upgrading large-diameter storm sewer installations to dry and wet ponds and storage tanks.

"Over the course of my career, I have chosen to ignore any external obstacles that may have been present because of the fact that I am female, but I have found my biggest challenge, like many other women, is my own confidence in my abilities," Fraser says. "I have frequently questioned my ability to move to the next, more senior position or take on a new challenge because I have not felt I was sufficiently prepared, however, I have been fortunate to have both male and female mentors or role models who have pushed me when I was not prepared to push myself. I think women have a tendency to 'bench' themselves, and I think in this male-dominated industry it is important we realize men and women may need to be managed differently when looking at succession planning and discussing career aspirations."

DEBRA HARRISON, P.ENG.

President, John Deere Canada

McGill University engineering graduate Harrison has spent her entire career with John Deere. She began in 1980 as a product engineer and progressed through roles of increas-

ing responsibility in Canada and the United States, and has travelled around the world to enhance product development effectiveness. In September 2017, she became president of John Deere Canada.

"During my 37-year career with John Deere, I have had the opportunity to develop my technical and leadership skills within product engineering," Harrison says. "However, I did have the opportunity to work in other functional areas, such as operations, customer and product support and enterprise quality to broaden my perspective and understanding of the business. Ultimately, this diversity in my career path provided me with the skills to be successful in my current role. There were challenges early in my career—as a woman in engineering I was not taken seriously and had to prove myself before I was accepted and listened to. Today I am happy to say that John Deere does an excellent job identifying and promoting high-performance employees who are able to deal with adversity and work effectively in cross-functional teams."



out on opportunities to bring diverse viewpoints to the table. I would like to see a change in the approach towards women engineers in both the public and private sectors."

VERA KAN, P.ENG.

Senior director, infrastructure renewal and renovations, University Health Network (UHN)

At UHN, Kan leads teams of project managers who deliver construction projects, such as interior renovations and renewal of building systems, to benefit patients, staff, researchers and educators at hospital sites. With approximately 30 staff, Kan and her team are responsible for approximately \$250 million of work. Previously, Kan was manager, infrastructure facilities at UHN, where she helped prioritize the network's capital renewal needs across all sites, and managed a \$25-million infrastructure program. "The value I bring to UHN is the engineering and management experience to care for the buildings and infrastructure that provide an environment for patient care, research and education," she says.



MAGDA ISHAK, P.ENG.

Manager, plan review, City of Toronto



Ishak is one of the managers in the City of Toronto building division managing a team of professionals whose role is to ensure building permit application documents comply with the Ontario Building Code and that other building safety requirements are met.

A graduate of civil engineering from Cairo University in Egypt, Ishak has much experience working

in what has traditionally been a male purview. Despite some challenges of being a woman professional in a male-dominated environment, Ishak has persevered and gone on to serve as a mentor to young women professionals. For a number of years, she delivered technical training sessions on behalf of the City of Toronto and the Ontario Society of Professional Engineers to prepare city staff and Ontario engineers in obtaining the required Ministry of Housing and Municipal Affairs' (MMAH) building code qualifications. She also supported junior professionals, especially junior professional women, by volunteering her time to help them pass the MMAH's challenging examinations. These exams are quite complex, especially for individuals whose first language is not English.

"Awareness is the first step towards resolution of any problem," Ishak says. "By overlooking the promotion of women engineers to leadership roles, our division missed

CHRISTINA KLEIN, P.ENG.

Head of traffic, Ontario Ministry of Transportation (MTO)

In her role with MTO's Eastern Region traffic section, Klein supports the delivery of safe and efficient operation of traffic on ministry highways and freeways. She is responsible for the planning and delivery of traffic engineering services, including signing, illumination, traffic signal design and operation, and traffic management for construction, maintenance, major incidents and special events. She also leads the development and implementation of new technologies, processes and concepts, such as intelligent transportation systems and traffic data collection technologies.



"It's from stepping into construction trenches during my co-operative education experiences that I came to learn how infrastructure is rehabilitated and replaced in the field," Klein says. "Building upon this knowledge, I managed infrastructure reconstruction and rehabilitation projects as a project engineer following graduation from the University of Waterloo. I embraced opportunities that arose for me to lead teams of various staff and stakeholders to accomplish milestone

initiatives, such as developing a Cycling Master Plan for Northumberland County and establishing a county-wide GIS (geographic information system)."

MONICA MONTEFIORE, P.ENG.

Project executive, real estate and workplace services, Google



Montefiore is the leader of large project teams in the design and construction of interior fit-outs of Google offices in the San Francisco Bay Area, running projects ranging in size from 5000 square feet to over 250,000 square feet, and accountable for budgets totalling close to \$300 million. "Once the properties are acquired [by another team within my department], I am responsible

for transforming them into the office spaces Google is famous for—with cafes and mini kitchens serving free food, fitness centres, meditation and massage rooms, game rooms, and much more," Montefiore says. "I also renovate and redevelop our existing building portfolio as needed for our fast growing company."

Prior to moving to California in 2014, Montefiore spent two years as director, business development and project management at SNC-Lavalin in Toronto, ON. She also spent several years as a green building consultant for Halsall Associates (now WSP Canada). She holds bachelor's and master's degrees in civil engineering from McMaster University in Hamilton, ON.

ANN NAKASHIMA, P.ENG.

Defence scientist, Defence Research and Development Canada (DRDC)

Nakashima was hired as a defence scientist after completing a master's degree at the University of British Columbia, and has been working at DRDC since 2004. Her work and research are aimed at enhancing the effectiveness of military personnel by optimizing cognitive, physical and physiological performance. "With my educational background in physics and mechanical engineering (acoustics), my specialization as a defence scientist is in auditory protection and performance," says Nakashima. "In this role, I have conducted noise measurements on shooting



ranges, inside armoured vehicles and onboard patrol frigates, as well as conducted laboratory experiments of speech communication and auditory perception in noise. My research supports recommendations for noise exposure assessment, auditory communication strategies and hearing conservation practices for members of the Canadian Armed Forces."

The work has taken on increased significance because, according to Veterans Affairs Canada, medical conditions of the ear comprise the second highest percentage of disability benefits.

LOUISE PANG, P.ENG.

Director, environmental design and engineering, Walt Disney Imagineering



University of Western Ontario engineering graduate Pang has just marked 15 years of service with the Walt Disney Imagineering Organization. She now oversees the engineering design and development of Disneyland expansion in Asia.

Shanghai Disneyland is Disney's first theme park in mainland China. It opened in 2016 after five years of construction. Consisting of six "themed

lands," it includes the largest castle in any Disney theme park, world class attractions and theatre designed for live entertainment. Ongoing projects for Pang include a new Toy Story-themed land in Shanghai Disneyland scheduled to open this year, and a multiphase expansion of Hong Kong Disneyland, featuring the addition of Frozen and Marvel-themed attractions. It would seem a dream job for any engineer—male or female—with a sense of wonder.

JULIA RAKOCEVIC, P.ENG.

Senior structural engineer, Toronto Transit Commission (TTC)

As the structural lead for technical review of the much-anticipated Eglinton Crosstown Light Rail Transit project in Toronto, ON, Rakocevic is up to her eyes in reviewing design and construction plans. It's all in a day's work for this dedicated practitioner who is proud of the profession and its ability to draw on the talent and experience of all players.

Rakocevic's track record at the TTC's structural engineering section includes designing direct fixation isolated concrete slabs for special track work, developing seismic guidelines for TTC under-



ground structures, reviewing consultants' design submissions for TTC projects, and ongoing updates of the transit commission's design manual. Her credo is that if you're going to design anything, endeavour to make it the best design it can possibly be, regardless of race, ethnicity, gender or work environment. She finds the TTC provides a good environment for such an approach. "The TTC is open-minded to entrusting senior positions to women," Rakocevic says. "As an organization, the commission takes great pride in its diversity and inclusiveness."

MARLENE RAMPHAL, P.ENG.

Director, return to service, Darlington nuclear refurbishment, Ontario Power Generation



Ramphal's role is critical to the success of bringing the Darlington Unit 2 nuclear reactor back from disassembly to commercial operations. The Return to Service \$12.8 billion project will provide the logic, schedule and detail testing to return systems for service in a sequence that ensures safety and reliability for continued operation of the Darlington reactor over the next 30 years. "I am confident

that my 28 years of nuclear experience and knowledge of Darlington will serve me well in my new role," Ramphal says. "I think back to my initial role of commissioning engineer of special safety systems and reactor components in 1989, when I performed reactor fuel bundle verifications and developed an appreciation for the level of attention to detail required to make the refurbishment project a success."

Ramphal was licensed by the Canadian Nuclear Safety Commission as a control room shift supervisor, shift manager, operations manager and duty manager for the Darlington Nuclear Generating Station and has the training and experience necessary for her current role. She performed important roles such as outage manager and has successfully executed planned maintenance outages that delivered reliable operations on scope, budget and schedule.

She is passionate about mentorship and is the chairperson of Bridging the Gap, an initiative sponsored by the Chief Nuclear Officer aimed at improving diversity and inclusiveness by reducing barriers for women to achieve leadership roles.

THERESA REDBURN, P.ENG.

Senior vice president, commercial and corporate development, Imperial Oil

These are heady times for Redburn in her executive role with Imperial Oil in Calgary, Alberta.

Although not practising front-line engineering, the Queen's University chemical engineering graduate and 32-year executive management veteran oversees commercial and land business development, new ventures, natural gas marketing, corporate planning and related policy and

environmental services. "It is an exciting time as our company is working on new technologies that will reduce the emissions intensity and freshwater use of operations by up to 90 per cent," she says. "While I no longer practise engineering, my degree gave me analytical and thinking skills I still use today, and provided the foundation for a diverse career path. I have had the privilege to work with many talented people within the company and found I was always treated with respect throughout my career."



HEATHER SHAM, P.ENG.

Senior director, Radeon program management, Advanced Micro Devices

Sham has been with Advanced Micro Devices for over 17 years. The first 11 years of her career were spent in post silicon engineering roles where she advanced from engineer



to manager to director. In 2012, she moved to the program management team and is now responsible for overall program delivery for all Radeon Graphics products from product feasibility through to full deployment.

"I had challenges early on in my career due to being shy and not always having confidence.

While this is common in women, it is not limited to a woman issue and many young engineers face the same challenge," Sham says. "I was able to overcome this by having mentors who helped in my development. And as key leaders, they recognized and acknowledged my performance and potential, and it helped me to build my confidence and recognize my own potential."

MARGARET STUART, P.ENG.

Director, systems engineering, Thales IFC

"If you have ever been on a commercial flight, you have probably used one of Thales's devices," says Stuart, a graduate of McMaster University's electrical engineering and management programs. Now based in Irvine, California, Stuart has parlayed a life-long interest in space and adventure into a cutting-edge career with in-flight entertainment systems.

"We supply the in-flight entertainment that keeps you occupied through those long hours spent—perhaps in a middle seat in economy class—on an airline. If you think about it, there are a lot of complex things that need to

be done to ensure your entertainment experience is as enjoyable as possible. We need to ensure the content we receive from the movie moguls loads properly, streams properly, that our software enables you to switch between games, music, movie, or the Internet, and that we have a connection to the satellites that makes your experience seamless," she says.



After Stuart and her team help the customer define what they want in their system, they take that design document and have it translated by system architects and system engineers into "engineer speak" by decomposing it into requirements and interface.

"My career has also been quite fascinating. When I was about eight years old, I vowed I would be an astronaut," she says. "I had caught the 'space bug' and was going to marry Captain Kirk from the original *Star Trek* series—but that is a whole other story. Although I can't say that I fulfilled that dream, I did work in the space industry for Spar Aerospace, working on the Canadarm for both the shuttle and space station programs. I am still very proud when I think that somewhere in a drawing vault are Canadarm drawings with my signature on them."

JUDY TSE, P.ENG.

Director, engineering review, engineering and construction services, City of Toronto

Tse graduated from the civil engineering program at the University of Waterloo and started her career with the private sector prior to moving into municipal government with the City of Vancouver. She joined the City of Toronto in 2003 as a transportation engineer, later became a senior development engineer reviewing development applications and subsequently managed a development engineering team in one of the districts in Toronto. Today she leads a team of about 90 staff who review land development applications, third-party construction applications, and maintain the city's utility mapping services.

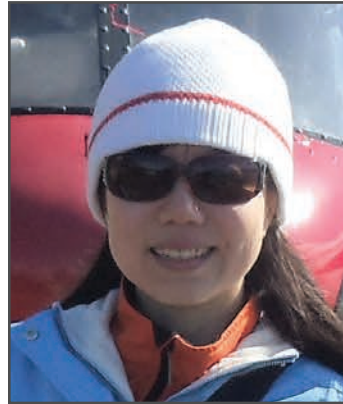


JIE YANG, P.ENG.

Technical director, mine hydrology, Hatch

Yang's main role is to provide technical solutions on mine water management, ensure quality of technical outputs, supervise and mentor supporting engineers, project and task management, and maintain client relationships and business development. At Hatch and at a few other engineering consulting firms, she has provided technical expertise for more than 50 mining projects in over 20 countries from the Arctic to the tropics.

A typical mining project sees Yang leading water management tasks covering all stages of the project cycle, including baseline study, conceptual design, pre-feasibility, detailed



engineering level studies, operational support and rehabilitation planning. While working with SNC-Lavalin, a 2011 mission saw Yang travelling to Greenland as part of a feasibility study for an iron ore project. The field trip had Yang investigating the drainage system, land cover, soil type, ice and snow melting conditions in the project area.

"I enjoy working as an engineer and I believe it is one of my greatest accomplishments when I could add value to a project, to the company and to sustainable mine development," she says. [e](#)

Do you know an outstanding female engineer you'd like us to feature? Let us know! We know there are many more shining examples out there, and we're always looking for P.Engs to profile and share with the community. Contact the editor at naxworthy@peo.on.ca.

P.ENGs RECOGNIZED FAR AND WIDE

By Marika Bigongiari



COWI International received the Ambassador Award and an Award of Excellence in the transportation category at the Canadian Consulting Engineering Awards for work on The World Trade Center Transportation Hub (Oculus) in New York, NY.

VanBoxmeer and Stranges Engineering Ltd. received a Canadian Consulting Engineering Award and a Wood WORKS! Award for work on Lazaridis Hall at Wilfrid Laurier University in Waterloo, ON.

The 2017 Canadian Consulting Engineering Awards were recently handed out at a gala event. The awards, which celebrate the height of engineering excellence, recognized 20 outstanding projects demonstrating a high quality of engineering, imagination and innovation, as well as providing social, economic and environmental benefits. A joint program of the Association of Consulting Engineering Companies–Canada (ACEC) and *Canadian Consulting Engineer* magazine, the awards are the most prestigious mark of recognition for consulting engineers in Canada. COWI North America was honoured with multiple awards, receiving both the Ambassador Award—a special award presented to a project constructed or executed outside of Canada showcasing Canadian engineering expertise—and an Award of Excellence in the transportation category, both for its work on the World Trade Center Transportation Hub (Oculus) in New York, New York. COWI was chosen to provide erection and construction engineering services to help realize the complex vision for the Oculus project. Bridge-building techniques were employed to erect the stunning structure, designed by architect and engineer Santiago Calatrava, who is known for ambitious designs that push the boundaries of structural engineering. The Oculus, comprised of approximately 12,500 tons of structural steel, forms the entrance to a new multi-billion-dollar transit station, the third largest in the city, serving over 200,000 commuters daily. Travellers make their way bathed in the glow of natural light, filtering through the massive 800,000-square-foot steel and glass structure—which looks much like a bird taking flight from lower Manhattan and has come to represent the resilience of New Yorkers, and the rebuilding of a key public space. COWI received a second Award of Excellence in the transportation category for its work on the Abraham Lincoln Bridge in Louisville, Kentucky. Several Ontario projects were also recognized with Awards of Excellence, including Lazaridis Hall of the Lazaridis School of Business and Economics, Wilfrid Laurier University, Waterloo, ON in the building category. Lazaridis Hall is a warm and engaging, wood-clad concrete and steel building with a unique drum-shaped lecture hall utilizing cantilevered girder trusses that lend it a floating quality. It also boasts a freeform structural glass skylight which, at 42 x 21 metres, may be the

AWARDS

largest single-layer trussless skylight in Ontario. Engineering services for Lazaridis Hall were provided by VanBoxmeer and Stranges Engineering, and among those honoured were: Richard Stranges P.Eng., Gerardus VanBoxmeer, P.Eng., Lijun Guo, P.Eng., and Bradley Stott, P.Eng. Winning firms Parsons and Harbourside Engineering were both honoured with an Award of Excellence in the transportation category for their work on the Burgoyne Bridge Replacement in St. Catharines, ON. Among those honoured at Parsons for design were: Brent Archibald, P.Eng., Sameh Salib, P.Eng., William Moore, P.Eng., and Nelson Guiot Rubiano, P.Eng. Those recognized at Harbourside Engineering for construction, erection and demolition included: Greg MacDonald, P.Eng., Robert Fraser, P.Eng., Kyle Boudreau, P.Eng., and Nicholas MacEachern, P.Eng. The project, which required the replacement of an aging 100-year-old high-level truss bridge with a landmark arch bridge, maintains a key link in the transportation system of the City of St. Catharines while enhancing the surrounding environment. The key players helped to erect a bridge that is not only a physical enhancement but also one of functionality and safety. Golder Associates was recognized with an Award of Excellence in the environmental remediation category for design and construction oversight on the Barrie Landfill Reclamation and Re-Engineering project—among those honoured were: Paul Dewaele, P.Eng., Frank Barone, P.Eng., Doug Kerr, P.Eng., and Martin Castillo, P.Eng. With the landfill impacting city water resources, remediation was critical. The project, which took seven years to complete, utilized an innovative composite geosynthetic liner, the first such use for a landfill in Ontario, and dealt with challenges relating to limited space, odour control and material management.

The 2017 Canada's Safest Employers Awards were recently handed out to recognize companies from across Canada with outstanding accomplishments in the promotion of health and safety in the workplace. They included 10 industry-specific categories, from hospitality to mining, with employers judged on a range of occupational health and safety elements. In the manufacturing category, Celestica brought home a Gold Award. With workers on a high-volume production line in its dynamic, fast-paced one-million-square-foot Toronto electronics manufacturing facility, safety is paramount, and a culture of progressive refinement of safety protocols contributed to winning the gold. Cementation Canada won a Gold Award in the mining and natural resources category for putting an emphasis on comprehensive safety programs and quality of safety initiatives. When it comes to ensuring the health and safety of its workforce, the company puts a strong focus on accountability, education and follow-up—with an expectation that everyone take safety seriously. Exemplifying a proactive safety culture worthy of an award, Cementation Canada, which has a goal of zero harm, recently implemented a five-year safety strategy.

Construction industry professionals, including architects, engineers, developers and others, recently came together to celebrate excellence in wood design at the 17th annual Wood WORKS! Awards. The awards honour those who advance the use of wood in all types of construction through



AECOM won the Wood WORKS! Institutional Wood Design Award over \$10 million for work on the McEwen School of Architecture in Sudbury, ON. Photo: Bob Gundu

design excellence, advocacy and innovation. Ontario Wood WORKS! presented 12 awards, with 10 going to specific projects and two given to professionals for outstanding contributions to the building industry showcasing wood design and construction. Wood WORKS! is a national, industry-led initiative of the Canadian Wood Council, promoting and supporting the use of wood in all types of construction. "It is our privilege to celebrate Ontario's wood design leaders through the Wood Design Award program," said Marianne Berube, executive director of the Ontario Wood WORKS! program. "Design professionals who understand the need for sustainable development are specifying wood products for innovative, environmentally responsible construction." Some of the award-winning projects included: Active House, Centennial Park in Etobicoke, ON, for which structural engineer Quaile Engineering took the Environmental Building Award; Lake House Condominiums in Grimsby, ON earned Tacoma Engineers Inc. the Mid-Rise Wood Design Award; St. David Catholic Elementary School in Sudbury, ON, for which engineers A2S Associates Ltd. took the Institutional Wood Design Award under \$10M; McEwen School of Architecture in Sudbury, ON, for which engineering firm AECOM took the Institutional Wood Design Award over \$10M; Ontario Wood Pavillion in Toronto, ON earned Moses Structural Engineers the Commercial Wood Design Award; Carpenters' Union Local 1669 Training Centre in Thunder Bay, ON, for which FORM Architecture Engineering took the Northern Ontario Excellence Award; and Lazaridis Hall, Wilfred Laurier University in



A2S Associates Ltd. won the Wood WORKS! Institutional Wood Design Award under \$10 million for work on St. David's Catholic Elementary School in Sudbury, ON. Photo: Blaine Nicholls

Waterloo, ON—adding to its Canadian Consulting Engineering Awards win—earned structural engineer VanBoxmeer and Stranges Engineering Ltd. the Interior Wood Design Award.

University of Windsor professor Andrzej Sobiesiak, P.Eng., recently received international recognition for his outstanding contribution towards advances in the knowledge of combustion processes and technologies with the Dionizy Smoleński Medal from the Polish Academy of Sciences. This is a special honour for Sobiesiak, head of the department of mechanical, auto-



The Ontario Wood Pavillion in Toronto, ON earned Moses Structural Engineers the Wood WORKS! Commercial Wood Design Award. Photo: BlackLAB Architects Inc.

otive and materials engineering, who studied with Professor Smoleński as an undergraduate in Warsaw.

The Royal Society of Canada (RSC) has recognized 12 eminent Canadian scholars and researchers for their outstanding achievements with eight medals and four awards. The RSC is the senior national, bilingual body of distinguished Canadian scholars, humanists, scientists and artists, with a primary objective of promoting learning and research in the arts, humanities and sciences. Included among the recipients is Keith Hipel, P.Eng., department of systems design engineering, University of Waterloo, who received the Miroslaw Romanowski Medal. The RSC also named 70 incoming members in the 2017 cohort of the College of New Scholars, Artists and Scientists, representing the emerging generation of scholarly, scientific and artistic leadership in Canada. Together, the members will address issues of concern to new scholars, artists and scientists with an aim of advancing understanding. Researchers will take advantage of the interdisciplinary approaches fostered by the college—which boasts gender parity and linguistic and cultural diversity—and strive to overcome disciplinary and academic boundaries in the common pursuit of knowledge. Among the 2017 cohort are: Jan Franklin Adamowski, P.Eng., department of bioresource engineering, McGill University; Joule Bergerson, P.Eng., department of chemical and petroleum engineering, University of Calgary; Frank Gu, P.Eng., department of chemical engineering, University of Waterloo; Zhen (Jane) Wang, P.Eng., department of electrical and computer engineering, University of British Columbia; and Wei Yu, P.Eng., department of electrical and computer engineering, University of Toronto. The RSC also



FORM Architecture Engineering won the Wood WORKS! Northern Ontario Excellence Award for work on the Carpenters' Union Local 1669 Training Centre in Thunder Bay, ON. Photo: Nicholas Bava, FORM Architecture Engineering

elected 89 new fellows to the Academy of Arts and Humanities, announcing their class of 2017, including one foreign fellow and two specially elected fellows—individuals with diverse backgrounds and disciplines who have been elected by their peers in recognition of outstanding scholarly, scientific and artistic achievement. Among those elected to the Academy of Science, Applied Science and Engineering Division: Richard Bathurst, P.Eng., department of civil engineering, Royal Military College of Canada; Reza Iravani, P.Eng., department of electrical and computer engineering, University of Toronto; Milica Radisic, P.Eng., department of chemical engineering and applied chemistry, University of Toronto; Bin Wu, P.Eng., department of electrical and computer engineering, Ryerson University; and Weihua Zhuang, P.Eng., department of electrical and computer engineering, University of Waterloo. In addition, Terence Peters, P.Eng., medical imaging, medical biophysics and biomedical engi-

neering, Western University, was elected to the Academy of Science, Life Science Division.

The annual University of Toronto faculty of engineering's Industry Partner Awards, which recognize key industry collaborations with the faculty, recently honoured Geosyntec with the Small-to-Medium Enterprise Partner Award for its long-term support of the department of chemical engineering and applied chemistry.

CALL FOR ENTRIES

Three Engineers Canada-Manulife scholarships valued at \$12,500 each will be available to support Canadian professional engineers returning to university to further study or research in an engineering field. Additionally, there are three Engineers Canada-TD Insurance Meloche Monnex scholarships, valued at \$7,500 each, also available to support Canadian professional engineers returning to university to further study or research, with studies being in a field other than engineering but complementary to the applicant's engineering practice. The deadline for consideration for the Engineers Canada scholarships is March 1, 2018. For more information, go to engineerscanada.ca/awards-and-honours/scholarship-program.

Nominations open for the 2018 Canada's Safest Employers Awards on February 1. The awards recognize companies from across Canada with outstanding accomplishments in promoting the health and safety of their workers. For more information, visit www.safestemployers.com. [e](#)

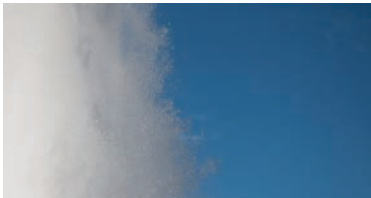
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January 2018



JANUARY 18-19

Fundamentals of Steam Utilization Seminar, Concord, ON
www.eventbrite.ca/e/fundamentals-of-steam-utilization-seminarregistration-37390754754?aff=es2



JANUARY 19

Waterloo Engineering Alumni Ski Day 2018, Blue Mountains, ON
uwaterloo.ca/engineering/events/alumni-ski-day-2018



JANUARY 21-MARCH 4

Go CODE Girl, across Ontario
www.onwie.ca/programs/go-code-girl



JANUARY 27-FEBRUARY 1

SPIE Photonics West 2018, San Francisco, CA
spie.org/conferences-and-exhibitions/photonics-west

JANUARY 22-24

AHR Expo, Chicago, IL
ahrexpo.com

JANUARY 21-MARCH 4

Codezilla Coding for Kids: Tech Toys Code + Play, Toronto, ON
www.eventbrite.ca/e/coding-for-kids-tech-toys-code-play-level-1-annex-tickets-38598897341?aff=es2

JANUARY 24

Advanced Composite Material for Multidisciplinary Engineering Applications, Toronto, ON
www.eventbrite.ca/e/advanced-composite-material-for-multidisciplinary-engineering-applications-tickets-39550005130?aff=es2

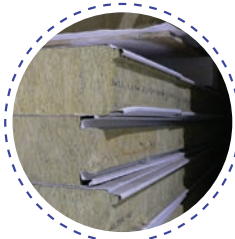


Photo: Achim Hering

JANUARY 29-FEBRUARY 2

Data Science Bootcamp, Toronto, ON
datasciencedojo.com/locations/toronto/

February 2018

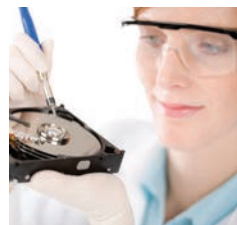
FEBRUARY 3-4

WISE National Conference 2018, Toronto, ON
www.eventbrite.ca/e/wise-national-conference-2018-tickets-38464642782?aff=es2



FEBRUARY 10

4TH Annual Women in STEM Conference, Pittsburgh, PA
www.eventbrite.com/e/4th-annual-women-in-stem-conference-tickets-39833657542?aff=es2



FEBRUARY 10-15

SPIE Medical Imaging 2018, Houston, TX
spie.org/conferences-and-exhibitions/medical-imaging

FEBRUARY 17-18

Live Your Potential: Women's Leadership & Career Development Program, Toronto, ON
www.eventbrite.ca/e/live-your-potential-25-day-womens-leadership-career-development-program-tickets-37550961938?aff=es2



FEBRUARY 12-13

3rd Human Factors Engineering & Usability Studies Summit, San Francisco, CA
exlevents.com/human-factors-engineering-usability-studies-summit

FEBRUARY 13-14

Advanced Autonomous Drive Conference 2018, San Francisco, CA
advancedautodrive.com



FEBRUARY 25-MARCH 1

SPIE Advanced Lithography, San Jose, CA
spie.org/conferences-and-exhibitions/advanced-lithography



FEBRUARY 28 & MARCH 1

International Conference on Water Management Modeling, Toronto, ON
www.icwmm.org



ENGINEERING A KODAK CAREER

Norm Naumoff, P.Eng., had an industrial engineering background that took him from the basement of Kodak Canada Inc. to president and chair, and beyond

By Marika Bigongiari

Norm Naumoff, P.Eng., graduated from the University of Toronto's industrial engineering program in 1966 and immediately got to work in the graduate development program in the basement of Kodak Canada Incorporated. He'd worked there as a student, liked the company and decided to stay on. A testament to his professional dedication and work ethic, he continued his studies at extension school while working full-time, earning an MBA (majoring in economics) at what is now the Schulich School of Business at York University.

Innovative and at the top of its game, Kodak was a natural fit for an engineer like Naumoff, who rose through the ranks until his retirement almost 38 years later as president and chair.

Norm Naumoff spoke to *Engineering Dimensions* from his home in Georgian Bay.

WORKING HIS WAY UP

Starting in the industrial engineering department, a new area of Kodak's engineering division, Naumoff got to work mapping out plant capacity studies, laying out facilities and calculating statistics for growth based on GDP. Early on, he was pleased to be part of a recommendation to the senior engineering team to buy 200 acres in Brampton, Ontario for a large industrial site in 1967. He spoke about working his way up through various senior engineering jobs, carrying out site planning, analyzing equipment needs and working with consulting engineers and architects. "My engineering background, industrial, fit perfectly with that—workflow analysis, looking at bottlenecks, where we thought the plant flow would be congested based on future volume—so it's systems thinking, and I think that's important for young engineers to know," says Naumoff.

It wasn't long before Kodak saw fit to place him in a management position, making him head of the manufacturing department in 1976. With a staff of over 3000 at the time, it was a challenging position that he excelled in, but soon he moved on to head the film emulsion and paper division, which he described as the heart of the company in those days: "It was a chemical company, today it's digital—it's a different company today than what I retired from," he says.

In 1984, those sharp analytical skills landed him the management of personnel and labour relations. This was a very different position. But he had years of leadership under his belt, a vast knowledge of technology and extensive experience working with people of diverse backgrounds in a supervisory role. This, combined with years of factory experience, saw him well-equipped to manage people and facilitate union negotiations—he engineered the human factor.

As the jobs and divisions changed over the years, one thing remained consistent: his knack for problem-solving

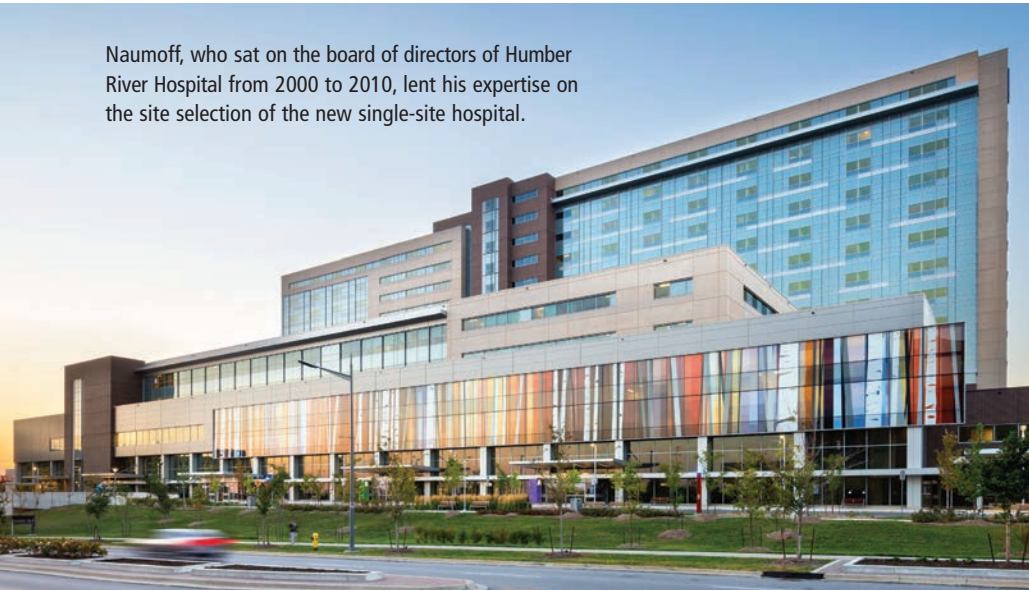
and ability to see the big picture. No matter what position he was in, he was an engineer. He was troubleshooting. He was thinking systems.

Eventually, he made the move to Rochester, New York, where he became the assistant to the senior vice president of global manufacturing and logistics for the Eastman Kodak Company in 1995. This gave him a big picture perspective, including exposure to global budgets and people from around the world. "We had factories in China, Brazil, France, England, India, Australia, Mexico, and of course all over the United States and a major one in Canada," says Naumoff. "So, I had a good global look at how the company worked, at how budgets were set—and they were fairly big budgets in those days—so it just broadened your management exposure." He returned to Canada in 1997 to become the vice president of manufacturing logistics for the Canadian company, eventually joining the board of directors and ultimately taking over as president and chair of the board in 1999. He retired at the start of 2004, after nearly 38 years with the company.

Summing up his time at Kodak as challenging and enjoyable, Naumoff stressed its progressiveness and innovative nature. "Eastman Kodak, even though it went through some very difficult technology changes, was a very progressive company for management systems," he says. He's proud of being a part of implementing several initiatives that reshaped the company. Perhaps the most dramatic example was the implementation of what was coined the Kodak Operating System, based on an operational philosophy called LEAN thinking. LEAN, a concept that's quite popular today, has roots in the Toyota Production System. Kodak Canada—a microcosm of the global company that made for the domestic market, exported globally and had manufacturing through to marketing—became a model for global operations. LEAN thinking was applied to all areas, from marketing and finance through to manufacturing and sales. In the 1990s, Kodak was changing its shape, and the LEAN philosophy was a critical factor in helping the company navigate some difficult growing pains. Says Naumoff: "We developed this in Canada—I'm very proud of this—this is where you look at the customer and you work backward from the customer and make what they really need, when they want it, and you push it through the process. But it's actually pulled by customer demand. It's a very simple concept for an industrial engineer, but very hard to do...and that was the model for Eastman Kodak, which is still used today in the digital company."

Other notable accomplishments were implementing SAP, a global software integration for the entire corporation—again, done in Canada first as a model for the Eastman Kodak company—and steering the company through

Naumoff, who sat on the board of directors of Humber River Hospital from 2000 to 2010, lent his expertise on the site selection of the new single-site hospital.



Norm Naumoff, P.Eng., at his home in Georgian Bay. "This is what a retired engineer looks like," he says.

International Standards Organization (ISO) certification, a challenging and lengthy process that included prepping to go through several quality standards. He would draw on this experience in post-retirement roles on the board of directors at both Humber River Hospital, where he eventually became chair, and the Georgian Bay Cancer Support Centre. Whatever the challenge was, Naumoff remained flexible and ready to meet it.

THE DIGITAL TRANSITION

Naumoff waxes poetic when the conversation turns to the camera film era, enthusiastically and adeptly describing a very detailed and complex film manufacturing process, culminating at the end of the assembly line with a roll of Ektachrome in a small yellow box. He wasn't a chemical engineer, but after living with it for so many years, he understood the technology and respected the process. He spoke of how film demands a degree of discernment, a level of skill with composition and lighting that digital does not. Digital technology, he points out, though phenomenal today and, ironically, created by Kodak back in the 1970s, doesn't require the same consideration that film does. Some may think that's a good thing. Others—industrial engineers, perhaps—might appreciate the thought process behind it. Explaining how Kodak wanted to marry the convenience of digital with the beauty of film's silver halide, he added they "had to be very careful not to kill the golden goose, but in the process, technology just kept changing." Naumoff says he still enjoys photography, joking, "I don't know what to do with all my Nikons," and adding, "I wanted to get into the marketing side because I really enjoyed that, but in those days, you went where you were told." As an engineer, he made it work.

Naumoff says his degree in industrial engineering, which he describes as a systems-oriented thinking degree, allowed

him to move between departments with ease and made him comfortable with change—and breaking things down into systems was a constant that helped him learn the business. He was an engineer no matter where he was. "Everyone has a process," he says.

A LIFER

Reflecting on his long career at Kodak, he mused on the rarity of being a lifer, noting that only one other classmate enjoyed a good career with a single company: "The others, amazingly, had anywhere from about three to 10 jobs—consultants, downsizing, let go, caught—nothing has changed from today with young people, when you really go back and look at what it was like to be in business even 50 years ago." He keeps in touch with his University of Toronto classmates—they get together regularly to catch up and recently celebrated their 50th class reunion.

When asked what advice he'd give a young engineer entering the workforce, Naumoff offered this: "First, understand the key process or drivers of whatever it is you start out with in the working world, and ensure your work is followed through to completion... be accountable for your creation. That builds true confidence. Second, never be afraid of a problem: problems are treasures to learn from... Third, find what you enjoy. If it's design, technology, pursue it. If it's dealing with people, pursue leadership of others. Failure to be true to your real interest can lead to unnecessary hidden stress over your work life. Lastly, think about your passion and what you want to accomplish. You're educated to think through issues. Do not dream about what you want to do—thinking is harder and will yield an action plan and path forward. An engineer is educated to do actionable things." Solid advice, for any industry. **e**

COUNCIL APPROVES PEO'S 2018-2020 STRATEGIC PLAN

By Nicole Axworthy

515TH MEETING,
NOVEMBER 16, 17, 2017



At the November 2017 meeting, Council approved PEO's new 2018-2020 Strategic Plan, its associated objectives and the communications rollout for the document.

In June 2016, Council set out to create a new strategic plan to focus PEO's activities for the next three years. Over the subsequent 17 months, staff, volunteers, government ministries and PEO's partners in the engineering community deliberated on the association's strengths and weaknesses and the perceived opportunities and threats it would face over the plan period (see "Developing PEO's next strategic plan," *Engineering Dimensions*, July/August 2017, p. 48). Vision and mission statements as well as PEO's core values were reconfirmed and strategic objectives were articulated.

As approved, the focus areas and strategic objectives set by the plan will determine the priorities for PEO programs and initiatives, and provide guidance for Council, committees, task forces and staff. The focus areas and objectives are:

Protecting the public interest

1. Refine the delivery of the PEAK program
2. Heighten delivery and awareness of PEO's enforcement efforts

Engaging stakeholders

3. Enhance PEO's public image
4. Engage chapters as a valuable regulatory resource
5. Increase influence in matters regarding the regulation of the profession

Advancing PEO's mission

6. Augment the applicant and licence holder experience
7. Redefine the volunteer leadership framework
8. Create a seamless transition from student member to EIT to licence holder
9. Enhance corporate culture

The strategic plan is not intended to be an action plan or work plan. Rather, it is a forward-looking blueprint to provide PEO with a common direction. Specific strategies and action plans, with targeted completion dates, will flow from the plan.

Council will monitor the plan's ongoing progress and the strategies to realize the plan's strategic objectives will be reviewed annually as part of PEO's budget-planning process.

The approved 2018-2020 Strategic Plan can be found at www.peostratplan.ca.

BUDGETS APPROVED

Council has approved the 2018 operating and capital budgets, as recommended by the Finance Committee. Despite efforts by management to reduce costs, the current version of the operating budget is projected to have a deficit of \$203,000. This deficit will be funded from the operating reserve of \$7.3 million, which is above the minimum cash balance requirement of \$4.5 million. Some of the reasons for the deficit are:

- the absence of membership fee increases since 2008, and revenues from the growth in the number of licence holders, applications, examinations, etc. have not been adequate to keep pace with inflation, which has increased cumulatively by 15.8 per cent since 2009;
- an increase in the backlog of applications in 2017 that await processing, which is largely due to staff absences resulting from accidents and long-term disability (steps have been taken to hire additional resources to deal with this backlog); and
- an increase in the scope and breadth of PEO's operations—several programs have been added and become part of regular operations over the course of the last several years, such as the Practice Evaluation and Knowledge (PEAK) program and an increase in the contribution for the Ontario Professional Engineers Awards gala.

In the draft operating budget, total revenues are budgeted at \$25.9 million, representing an increase of \$461,000 or 1.8 per cent over the 2017 forecasted revenue. This increase is largely due to:

- an increase in application, registration, exam and other fees of \$327,000 or 5.1 per cent due to an increase in certificate of authorization, application, exam and EIT revenues;
- an increase in P.Eng. revenue dues of \$256,000 or 1.6 per cent due to growth in P.Eng. membership;
- an increase in advertising revenues by \$60,000 or 20 per cent due to an expected improvement in market conditions; and
- a decrease in 40 Sheppard Avenue building revenues of \$187,000 compared to 2017 due to a large payout for the early termination of a lease by a tenant in 2017.

P.Eng. licence fees will remain frozen for the 10th consecutive year. All other fees remain frozen for the seventh consecutive year. The cur-

rent version of the 2018 budget assumes all fees remain unchanged.

The 2018 budget expenses are planned to be \$26.2 million, which represents an increase of \$977,000 or 4 per cent over 2017 forecasted expenses. The increase is largely due to:

- an increase in employee salaries and benefits and retiree and future benefits of \$411,000 over the 2017 forecast due to a 3 per cent increase in staff salary for merit increases and CPI adjustment;
- an increase in costs for computers and telephones of \$300,000 due to web hosting expenses for the PEAK program application, support contracts for various IT infrastructure services and teleconferencing costs for the regional candidate meetings approved by Council;
- an increase of \$191,000 in purchased services largely due to higher costs for the electronic voting agent, costs for event meals and related expenses for the Order of Honour and various events, and costs for producing the ethics video for the PEAK program;
- an increase of \$63,000 for two new contract staff—one for assisting in clearing up the current application backlog and one for helping clean up member data;
- an increase of \$50,000 for professional development courses for staff and volunteers compared to the 2017 forecast;
- an increase of \$36,000 in volunteer business expenses due to higher costs for meals, mileage, accommodation and travel-related expenses for attending various events, committee meetings and conferences; and
- an increase of \$31,000 in amortization due to the completion of IT projects.

The increased expenses were partially offset by reductions of:

- \$142,000 in legal costs primarily due to lower legal expenses for small claims-related litigation and employment-related matters;
- \$26,000 in costs for consultants largely due to no costs for consultations for the public information campaign in 2018 as the relevant work is expected to be completed in 2017, no consulting costs for the elections audit in 2018, lower costs for IT consultants, etc. These decreases are partially offset by an increase in costs for consultants for the PEAK program, Succession Planning Task Force, Government Liaison Program, etc.; and
- \$13,000 in postage and courier costs as members are being encouraged to download receipts and related correspondence directly from the web portal.

The capital budget for 2018 is \$2.52 million, which comprises capital improvements to PEO headquarters (\$2.13 million), information technology (\$342,000) and facilities (\$45,000). Capital improvements planned for 40 Sheppard include security improvements in the reception area, replacement of the emergency generator, elevator upgrades, and replacing exterior windows and heat pumps. Significant IT expenditures for the year include upgrading

the PEO website and portal, and updating the SQL server, Aptify, financial system and hardware. The planned facilities expenditure for 2018 include replacing furniture and aging audio-visual equipment and upgrading the phone system.

BORROWING RESOLUTION

Council carried a motion to renew PEO's borrowing policy, which includes an operating line of credit and corporate credit cards with Scotiabank, until January 31, 2019. Council approved an operating overdraft for an amount not to exceed \$250,000, and use of corporate credit cards with an aggregate limit not to exceed \$120,000. Council was told PEO has an adequate cash flow to meet its business requirements on a regular basis, and the overdraft facility is only for contingency purposes. Corporate credit cards provide convenience to senior volunteers and senior staff for PEO business expenditures. The credit card balances are paid off every month.

AGM SUBMISSION APPROVED

At its November meeting, Council directed the registrar to issue a call for volunteers for appointment to a seven-member Phase 1 Governance Working Group (GWGP1), comprised of four current councillors and three additional members at large, with preference given to members who have formal governance education. Council also directed the chair to develop terms of reference and approved a \$40,000 budget for the working group to complete its work and deliver a report to Council before the 2019 Annual General Meeting, or earlier.

This motion was a result of a member submission that was passed at PEO's 2017 Annual General Meeting that suggested "PEO engage an external governance expert to advise Council independently on how to modernize the governance of the organization in order to ensure self-regulatory status and that the principles of the new governance model be presented to Council for approval before the next AGM." The submission later evolved to suggest the creation of a governance working group as a first phase before committing to an external expert.

The purpose of the new GWGP1 is to develop a clear definition and understanding of the issue and evaluate the risk of PEO losing its self-regulatory status and remaining relevant as a regulator. Work of the recent governance-related task forces, such as the Council Term Limits Task Force, Succession Planning Task Force and Council Composition Task Force, will be considered. The group will also develop a Request for Submission to engage a regulatory governance expert to review PEO's current governance model, and to provide input on the desired qualifications of the governance expert and bid evaluation criteria.

The GWGP1 is expected to provide a progress report to Council prior to the 2018 Annual General Meeting, which will include timing for the delivery of its final report to Council. The report will confirm if an external governance review is warranted. If not, no further action is needed. **e**

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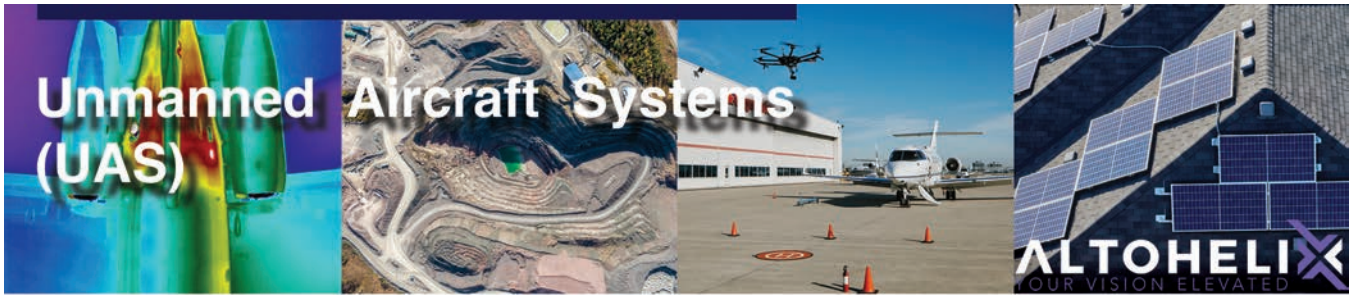
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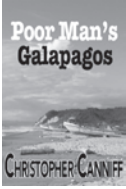
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Poor Man's Galapagos
 by Christopher Canniff, P.Eng.
(Blue Denim Press, 2015, submitted for the 2016 Scotiabank Giller Prize) is a novel about Tomas, an irrigation engineering student living on a small, impoverished island in Ecuador, South America, who searches for answers after his father, a renowned British travel writer, suddenly leaves the island.



Please see: <http://bluedenimpress.com/books/poor-mans-galapagos/> and www.christophercanniff.com and <http://www.scotiabankgillerprize.ca/canlit/2016-crazy-for-cantit/>

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Deadline for the May/June issue is March 23, 2018. Deadline for the July/August issue is May 30, 2018.

Risk management for engineers

Ahmed Fathi Shalabi, P.Eng.,
Ottawa, ON

I enjoyed reading the article “How safe can you really make it?” in the November/December 2017 issue of *Engineering Dimensions* (p. 26). About 25 years ago we asked a similar question, although slightly more accurate from a nuclear regulatory viewpoint, because it was directly applicable to the public and, eventually, the environment: “What is the acceptable risk and why?” No matter how safe an engineer can make it, there will always be an inherent residual risk.

The methodology of how to integrate risk management and process safety management systems requires a better understanding of how a decision is made and who is accountable for that decision. The complexity of the aforementioned integrated systems poses a challenging interdisciplinary growth mindset (leadership) in developing and understanding new safety analyses and accident models, involving not just professional engineers but also experts from social sciences, organizational theory, cognitive psychology and Cynefin (complexity).

I would also like to highlight some assertions and provide references for clarification:

- There is an inconsistency in the usage of hazard, risk and risk-based—see *Risk Management: An Area of Knowledge for All Engineers* by Paul Amyotte, P.Eng., and Douglas McCutcheon, P.Eng., 2006, engineerscanada.ca/sites/default/files/risk_management_paper_eng.pdf
- The swiss cheese model has evolved beyond a direction of causality which is linear and the static view of the organization. The defects are often transient. The holes in the swiss cheese are continually moving in a nonlinear/complex manner—see *A New Accident Model for Engineering Safer Systems* by Nancy Leveson, 2004, sunnyday.mit.edu/accidents/safetyscience-single.pdf

- “...the regulatory ministries agreed to an overarching risk-management framework within which each ministry was required to develop a business-specific model. The Treasury Board recently released a new Ontario Public Service enterprise risk management framework that provides guidance to ministries on the risk journey” (p. 30). This is inaccurate because: 1) the definition of risk contained in ISO 31000 (Risk Management) needs to be revised, and 2) risk thinking, contained in ISO 9001 (Quality Management) is not defined—see *Engineering Risk Management* by Thierry Meyer and Genserik Reniers, 2016, e-ISBN (pdf) 978-3-11-041804-0

I fully concur with the comment made by Amanda Sistilli, P.Eng., that continued engagement with all stakeholders is needed in terms of “...[developing] plans that reduce the potential impact on the community” (p. 31). Furthermore, we need to do a better job communicating the social impact, which can be defined as: the consequence experienced by all stakeholders due to any changes associated with significant engineering/resource projects or designs for the life cycle of the product/service. Social impacts can involve changes to stakeholders’: 1) way of life, 2) access to and use of infrastructure, services and facilities, 3) culture, 4) health and well-being, 5) surroundings, 6) personal and property rights, 7) decision-making systems, and 8) bias, perceptions and aspirations. Can we communicate a balanced approach for defining the social impacts versus the benefits? Maybe a good starting point would be for PEO, or Engineers Canada, to develop a policy guideline on risk communication for professional engineers, similar to this one in the UK: www.engc.org.uk/engcdocuments/internet/website/Risk%20Communication%20and%20Professional%20Engineers.pdf

CORRECTION

On page 7 of the November/December 2017 issue, we reported that engineers who attended the September 21 presentation organized by PEO’s West Toronto and East Toronto chapters were eligible to receive a Technical Seminar Attendance Certificate, which can be credited towards knowledge activity hours under PEO’s Practice Evaluation and Knowledge (PEAK) program. In fact, PEO does not endorse any chapter event as being PEAK-eligible and does not require a certificate as confirmation of attendance for PEAK knowledge activity hours.

LETTERS TO THE EDITOR are welcomed, but must be kept to no more than 500 words, and are subject to editing for length, clarity and style. Publication is at the editor’s discretion; unsigned letters will not be published. The ideas expressed do not necessarily reflect the opinions and policies of the association, nor does the association assume responsibility for the opinions expressed. Emailed letters should be sent with “Letter to the editor” in the subject line. All letters pertaining to a current PEO issue are also forwarded to the appropriate committee for information. Address letters to naxworthy@peo.on.ca.

Tighten up licensing requirements

Don R. Ireland, P.Eng.,
Brampton, ON

In his message, our new president expressed his view that the status quo of our accreditation process for licensing is “smarter” and superior to other professions and no changes are needed (“Engineering a smarter approach to licensure,” July/August 2017, p. 6). In the September/October 2017 issue, Mr. Kerr, P.Eng., questions some of that thinking (“Remaining self-regulated” p. 48), and I also wonder if the positive assessment by our president is completely in line with the outcomes and even the principal ethic of our duty to set public welfare as paramount.

Our president seems to feel that a bachelor’s degree from an accredited university or equivalent is still a sufficient technical requirement for licensure. In fact, we already partially downgraded that requirement about 15 years ago by allowing limited licences for OACETT candidates. He mentions that the gold standard for other professions is an additional requirement of passing technical exams and notes that, in the United States, graduates must pass two eight-hour exams for licensure. The article points to the fact that we are top exporters of engineering services and are known as world class. However, I agree with Mr. Kerr that we remain an “invisible” profession in Canada and do not have nearly as much respect, or are as well compensated, as other professions or American engineers in their home country. I think it is worth questioning why and protecting the good reputation of the future generation of Canadian professional engineers.

My perspective is as an employer in a small consulting firm who has seen the quality of our own graduates deteriorate over the years and have seen first-hand the variable quality of graduates from “equivalent” programs in offshore engineering programs. In our practice, we had to devise our own brief test of basic knowledge of engineering fundamentals for new job candidates. I can think of at least three of the foreign trained candidates who had the necessary skills and who went on to successful engineering careers. However, we found that about 70 per cent of the internationally trained candidates did not have sufficient knowledge or competency in structural engineering principles. Yet, it was disturbing to learn that for at least two of those candidates, their education requirements had been met and they were about to receive licensure or were part of the EIT program.

Personally, I believe our accreditation model may have been sufficient 30 to 50 years ago, when candidates were mostly from a few Canadian universities where the quality of education was well known. However, Canada has changed and it seems that the accreditation board is having difficulty determining the equivalency of engineering programs and measuring curriculum content in overseas institutions. I believe it is probably time to tighten up the licensure requirements by adding “basic principles” exams that are discipline specific. That would likely help to ensure candidates actually have the skills and knowledge to design reliable systems, help correct the perception that our skills are general in nature rather than specialized and better protect public safety.

Safety in manufacturing

Anthony Kerstens, P.Eng., Aurora, ON

I opened my *Engineering Dimensions* today, excited to see the cover addressing the topic of safety. Then I read the article “How safe can you really make it?” with the subtitle mentioning “engineers looking to advance a culture of safety across all industries” (November/December 2017, p. 26).

Although I read this article with great interest, and applaud the efforts of all those mentioned, any mention of the manufacturing/machinery sector was glaringly absent. Considering that automotive and other manufacturing is a significant economic driver in Ontario, and that many engineers are employed by that industry, I would have hoped to see some mention of it.

Since about 2000, Regulation 851 of the OHS Act has required pre-start health and safety reviews in factories for the following items: 1. flammable liquids, 2. machinery with interlocking guards, 3. racks, 4. processes involving a risk of ignition or explosion, 5. dust collectors involving a risk of ignition or explosion, 6. molten materials, 7. cranes and other lifting devices, and 8. risk of exposure above the regulated limits of biological, chemical and designated substances. PEO even had a committee and produced a guideline for engineers performing such reviews. In the time since, there have been significant changes to CSA and international safety standards, as well as the development of the concepts of “functional safety.” At present, it is possible for engineers to take functional safety certification courses in the areas of both process and machinery. I suggest the author do some more research and write a follow-up article.

I have just read some of the letters to the editor in the September/October 2017 edition of *Engineering Dimensions*, and I am dumbfounded by the extent to which supposedly highly educated and professional people can be taken in by a few hypocritical crackpots like Gore, Suzuki and Butts. As one of those letters quite correctly points out, they “don’t have a hope of understanding” climate change (“Erring on the side of safety,” p. 48). It doesn’t take a huge leap of faith to see the whole climate change fiasco is nothing more and nothing less than a huge money grab, founded on fake science and mass marketing. This is simply the anti-nuke campaign of the last century times 10, aided and facilitated by social media. I call upon fellow members and intelligent people everywhere to put a stop to this hoax and to the misguided and destructive redistribution of wealth that it spawns.

No hope of understanding

Dave Winlow, P.Eng., Cambridge, ON

Redefining engineer for the future

B. Grant Gordon, P.Eng.,
Belleville, ON

The first two definitions of an engineer in the *Concise Oxford Dictionary of Current English* (1974) are:

- (1) designs and constructs military works; a soldier of the branch of the army called ‘Engineers’; trained to engineering.
- (2) one who designs works of public utility, bridges, canals, gas-works, etc.; maker of engines.

Unfortunately, I don’t fit into any of those categories since I received my degree in electrical engineering but then worked only in the highly specialized field of electro-optics, which originated in Albert Einstein’s paper “The Photo-Electric Effect” of 1905.

I was employed initially as a device designer and later as a quality and reliability assurance engineer in the same field. For example, I worked on electronic devices that were utilized by higher level customers in their products, i.e. we were near the bottom of the food chain (as it were)—so safety was not our prime requirement, but it would eventually be the concern and the responsibility of the end-user.

For the work I did, my engineering degree by itself was more than adequate—the P.Eng. was never an actual job requirement! More than that, since our customers were primarily American or European, the signature and seal of a professional engineer was irrelevant to them. As long as my superiors in the company had approved my work, that was all our customers needed or wanted to know.

For my employers and myself, there were only two requirements for our devices: that they be of the highest quality consistent with maximum reliability. Anything less was completely unsatisfactory!

Based on the history I know of the engineering profession in Canada, it seems to have been formed and driven by civil engineers with the natural need for safety foremost in their minds.

Obviously, this is not a bad thing—but it is NOT always what every engineer considers important or necessary in his/her particular job.

The point I wish to make is many of the engineering requirements in Canada for a P.Eng. today are not applicable to what many of us in the engineering community do daily.

This makes me think we need to re-examine the engineering profession and redefine it for the 21st century and beyond, especially as we are approaching the centennial of our profession.

One suggestion I have for PEO is to split the profession into two significantly different groups, for example:

1. “Civil” (my suggested nomenclature for engineers who require safety in all their work) and;
2. “Designer” (my suggested nomenclature for those individuals for whom safety is not the prime concern).

These terms above are a suggestion only and can obviously be discussed and/or modified.

I offer these thoughts to you and the executive as a part of the discussion that I believe is required to improve the high level of engineering effort in Canada, however that may be defined.



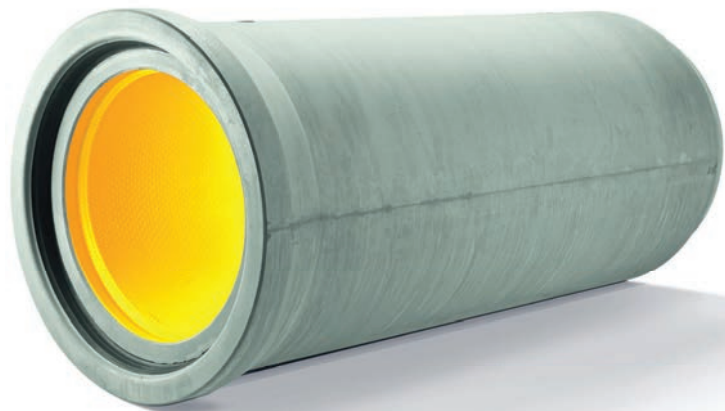
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