

SEPTEMBER/OCTOBER 2020

ENGINEERING DIMENSIONS

**PRESIDENT
MARISA STERLING**

aims to reimagine
PEO together



ALSO INSIDE:

- > 10 leading women aerospace engineers
- > PEAK launches new ethics module
- > Resolving disagreements about use of the P.Eng. seal



Professional Engineers
Ontario



Just the *facts*

about Engineers Canada-sponsored
Critical Illness Insurance

Maybe you can relate to Jen,* P.Eng., 2007. She's an established civil engineer, loves her job, loves her two children, and she and her partner are grateful for their health.

Or **maybe you can relate to Matthew,*** P.Eng., 1996. He's an established chemical engineer, loves his job, loves his daughter, and he's grateful for his recovery from a stroke. Unfortunately, his wife was recently diagnosed with breast cancer.

Matthew and his family have had a tough time, while Jen and her family have been lucky. But that doesn't mean Jen's family is immune to critical illness – which is why **it's important to be prepared.**

Manulife

1 Canadian Cancer Society, "Nearly 1 in 2 Canadians expected to get cancer: report," June 20, 2017.
 2 Heart & Stroke, "Stroke Report 2016 just released!," June 9, 2016.
 3 ctvnews.ca, "The Health of Canadians: Looking back at 60 years of heart health," February 3, 2015.
 4 Net 5-year survival rate.
 5 Survival rate for those who have a heart attack and get to a hospital. Heart & Stroke, "Getting to the Heart of the Matter," 2015. 6 Heart & Stroke, "The Heart & Stroke 2017 Stroke Report," July 19, 2017.
 7 TheRecord.com, "Cancer patients face high out of pocket expenses," April 15, 2017.

Manulife, Manulife & Stylized M Design, and Stylized M Design are trademarks of The Manufacturers Life Insurance Company and are used by it, and by its affiliates under license. All rights reserved. © 2020 The Manufacturers Life Insurance Company. All rights reserved. Manulife, P.O. Box 670, Stn Waterloo, ON N2J 4B8. Accessible formats and communication supports are available upon request. Visit manulife.ca/accessibility for more information.

Underwritten by
The Manufacturers Life Insurance Company

✓ Critical Illness is all too common.

The statistics relating to critical conditions are eye-opening:



1 in 2

Canadians will develop cancer.¹



1 in 3

Canadians will develop stroke, dementia, or both.²



1 in 2

Canadians will be impacted by heart disease.³

✓ More people are surviving critical illness

Certainly, the good news is that, despite the fact that facing a critical illness can be frightening, **more and more people are surviving** these days thanks to medical breakthroughs. Consider these numbers:

	Cancer	Heart attack	Stroke
Survival rate	60% ⁴	95% ⁵	80% ⁶

✓ But what about the financial cost?

Survival is priceless. However, **many cancer patients spend over \$20,000** on various costs during their treatment.⁷ And consider the lost wages suffered by the more than 400,000 Canadians who live with long-term disability due to stroke.⁶

✓ Critical Illness Insurance can help

Engineers Canada-sponsored Critical Illness Insurance **pays a lump sum** upon diagnosis of a covered life-threatening condition, to help in any way you choose. You and your spouse may apply for benefit amounts between **\$25,000 and \$1 million**. Choose one of two plans to cover either 6 or 18 conditions.

To learn more and apply:

 manulife.ca/dimensionsCI
 **1 877 598-2273**



ENGINEERING DIMENSIONS



FEATURES

- 16 **NEW PRESIDENT STAYS OPTIMISTIC AMID PARADIGM SHIFT**
By Marika Bigongiari
- 29 **10 LEADING WOMEN ENGINEERS IN CANADA'S AEROSPACE INDUSTRY**
By Marika Bigongiari and Adam Sidsworth

SECTIONS

ASSOCIATION BUSINESS

- 5 Editor's Note
6 President's Message
8 CEO/Registrar's Report
21 Gazette
47 2021 Order of Honour call for nominations

NEWS AND COMMENTARY

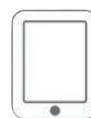
- 9 This year's Ontario Professional Engineers Award recipients to be honoured in 2021; Ontario engineers develop COVID-19 tracking app; PEO introduces new PEAK ethics module; New Engineers Canada president focuses on strategic plan; University of Toronto graduate writes award-winning thesis on diversity and representation in engineering education
- 40 Awards
43 Bulletin Board
44 Viewpoint: Guiding the profession into the future requires a focus on education and ethics
46 Letters

PROFESSIONAL ISSUES

- 15 Professional Practice: Resolving disagreements involving the use of the professional engineer's seal

ADVERTISING FEATURES

- 45 Professional Directory
46 Ad Index



DIGITAL EDITION

Read *Engineering Dimensions* from anywhere! Visit engineeringdimensions.ca to read our current digital edition, view issue archives, print and share articles and download the magazine as a PDF document.

ON THE COVER

- 29 10 leading women aerospace engineers
11 PEAK launches new ethics module
15 Resolving disagreements about use of the P.Eng. seal

ENGINEERING DIMENSIONS

PUBLICATIONS STAFF

Editor

Nicole Axworthy
editor@peo.on.ca

Associate editor

Marika Bigongiari

Associate editor

Adam Sidsworth

Senior graphic designer

Stephanie Katchmar

Graphic designer

Cindy Reichle

Manager, communications

Duff McCutcheon

Digital communications

coordinator

Michelle Yiu

ADVERTISING SALES

Account executive

Charlene Woron
cworon@dvtail.com

Dovetail Communications
30 East Beaver Creek Road
Suite 202
Richmond Hill, ON L4B 1J2
Tel: 905-886-6640
Fax: 905-886-6615

EXECUTIVE STAFF

CEO/Registrar

Johnny Zuccon, P.Eng., FEC
registrar@peo.on.ca

Acting deputy registrar, licensing

and registration
Linda Latham, P.Eng.

Deputy registrar,

regulatory compliance

Linda Latham, P.Eng.

Deputy registrar, tribunals and

regulatory affairs

Johnny Zuccon, P.Eng., FEC

Chief Administrative Officer

Vacant

Director, communications

David Smith

Director, finance

Chetan Mehta, MS, MBA

Director, human resources

Lolita Holden, CHRL

Director, information technology

Michelle Wehrle

PEO COUNCIL

Officers

President

Marisa Sterling, P.Eng., FEC
president@peo.on.ca

Past President

Nancy Hill, P.Eng., LLB, FEC,
FCAE

President-elect

Christian Bellini, P.Eng., FEC

Vice president (elected)

Darla Campbell, P.Eng., CSR-P

Vice president (appointed)

Arthur Sinclair, P.Eng.

Executive Members

Arjan Arenja, MBA, P.Eng.

Michael Chan, P.Eng., FEC

Lorne Cutler, MBA, P.Eng.

Councillors

Councillors-at-large

Leila Notash, PhD, P.Eng., FEC

Sandra Ausma, PhD, P.Eng.

Michael Chan, P.Eng., FEC

Eastern Region councillors

Randy Walker, P.Eng., FEC

Chantal Chiddle, P.Eng., FEC

East Central Region councillors

Arthur Sinclair, P.Eng.

Peter Cushman, P.Eng.

Northern Region councillors

Ramesh Subramanian, PhD,
P.Eng., FEC

Luc Roberge, P.Eng., FEC

Western Region councillors

Wayne Kershaw, P.Eng., FEC

Peter Broad, P.Eng., FEC

West Central Region councillors

Warren Turnbull, P.Eng., FEC

Lisa MacCumber, P.Eng., FEC

Lieutenant governor-in-council

appointees

Arjan Arenja, MBA, P.Eng.

Robert Brunet, P.Eng.

Todd Bruyere, P.Eng.

Lorne Cutler, MBA, P.Eng.

Andy Dryland, C.E.T.

Qadira C. Jackson Kouakou,
BA, BSW, LLB

Iretomiwa Olukiyesi, P.Eng.

Sherlock Sung

Engineers Canada Directors

Christian Bellini, P.Eng., FEC

Danny Chui, P.Eng., FEC

Nancy Hill, P.Eng., LLB, FEC,
FCAE

Kelly Reid, P.Eng., IACCM CCMP

Changiz Sadr, P.Eng., FEC



Professional Engineers
Ontario

Engineering Dimensions (ISSN 0227-5147) is published bimonthly by the Association of Professional Engineers of Ontario and is distributed to all PEO licensed professional engineers.

Engineering Dimensions publishes articles on association business and professional topics of interest to the professional engineer. The magazine's content does not necessarily reflect the opinion or policy of the Council of the association, nor does the association assume any responsibility for unsolicited manuscripts and art. All material is copyright. Permission to reprint editorial copy or graphics should be requested from the editor.

Address all communications to The Editor, *Engineering Dimensions*, PEO, 40 Sheppard Avenue West, Suite 101, Toronto, ON M2N 6K9. Tel: 800-339-3716.

Engineering Dimensions is a member of Canadian Business Press.

Indexed by the Canadian Business Index and available online in the Canadian Business and Current Affairs Database.

US POSTMASTER: Send address changes to *Engineering Dimensions*, P.O. Box 1042, Niagara Falls, NY, 14304.

CANADA POST: Send address changes to 40 Sheppard Avenue West, Suite 101, Toronto, ON, M2N 6K9.

Canada Publications Mail Product Sales Agreement No. 40063309. Printed in Canada by Wellington Printworks Inc.

SUBSCRIPTIONS (Non-members)

Canada (6 issues) \$33.90 incl. HST

Other (6 issues) \$40.00

Students (6 issues) \$16.95 incl. HST

Single copy \$4.50 incl. HST

Visit: peo.on.ca/about-peo/engineering-dimensions

Approximately \$5.00 from each membership fee is allocated to *Engineering Dimensions* and is non-deductible.



Recyclable where facilities exist

CONNECT WITH US

Web: peo.on.ca

Tel: 800-339-3716



twitter.com/PEO_HQ



[linkedin.com/company/peo---professional-engineers-ontario](https://www.linkedin.com/company/peo---professional-engineers-ontario)



[facebook.com/ProfessionalEngineersOntario](https://www.facebook.com/ProfessionalEngineersOntario)

LET US KNOW

To protect the public, PEO investigates all complaints about unlicensed individuals or companies, and unprofessional, inadequate or incompetent engineers. If you have concerns about the work of an engineer, fill out a Complaint Form found on PEO's website and email it to

complaints@peo.on.ca.

If you suspect a person or company is practising engineering without a licence, contact PEO's enforcement hotline at 800-339-3716, ext. 1444, or by email at enforcement@peo.on.ca.



THE SKY'S THE LIMIT FOR WOMEN ENGINEERS

By Nicole Axworthy



The inspiration to become an engineer often begins in childhood. For the 10 women aerospace engineers we're profiling in this issue ("10 leading women engineers

in Canada's aerospace industry," p. 29), it was an early interest in math and science, a natural curiosity for learning how things work, or a family member who inspired them. Although these women likely didn't have other female engineers in their lives to look up to at the time, they all had the determination and fearlessness to follow their dreams. And they are now leaders in the field, contributing to such projects as the renowned Canadarm used on NASA's Space Shuttle Program; the Rosalind Franklin (ExoMars) rover, which will be used in the 2022 mission to Mars; the Bombardier Global 7500 business jet, the world's largest and longest-range business aircraft; and military aircraft for the Canadian Armed Forces. I relish the opportunity to read and share the personal stories of engineers who are working directly in the field, and these stories stand apart because of the fascinating nature of their work.

And as promised, in this issue we're also sharing an in-depth profile of

PEO's 2020–2021 president, Marisa Sterling, P.Eng., FEC, who is featured on the cover page. As you'll read in "New president stays optimistic amid paradigm shift" (p. 16), Sterling's presidential term is unlike that of her predecessors because of COVID-19 and the sudden shift in how we conduct business. As she handles her year-long responsibilities from the makeshift office in her dining room, she's keenly aware of the short timeline she has to achieve her vision. But she's handling it all with grace, proving she's a results-driven leader working to engage the public and government and rising to the challenges that come with implementing change within a 98-year-old regulator to ensure it is keeping up with the public's needs.

Next, flip over to page 47, where you'll find our call for nominations for PEO's 2021 Order of Honour, which annually recognizes professional engineers who have volunteered their time to the profession. Be sure to make note of the October 9 deadline if you have someone in mind whom you'd like to nominate for the prestigious award.

Finally, I'd like to thank everyone who took the time to send in their suggestions for our annual call for ideas. Rest assured I read each and every email. Your input is so helpful as we finalize our editorial themes for 2021. **e**

THIS ISSUE PEO is charting new territory as it deals with the realities of a pandemic. Marisa Sterling, P.Eng., FEC, PEO's 2020–2021 president, is leading the way as PEO navigates professional regulation in the virtual domain. We also profile 10 women who are soaring to new heights in aerospace engineering, a profession long dominated by men.

MAKING PEO FUTURE READY

By Marisa Sterling, P.Eng., FEC



If there's one goal that unites the world during this pandemic, it is for all life on this planet to be healthy and safe. This includes the lives of our family and friends, the health of our agriculture and food systems, the safety of our housing and the access we have to one another online. Our connectedness and interdependence

are evident now more than ever as we collaborate worldwide to stay safe. The pandemic shows us the fragility of our existence and why protecting the public interest and well-being is paramount.

Since PEO was created in 1922, we have been unified as engineers and licence and certificate holders by our single goal of protecting the public interest. I refer to it as our North Star. There have been many outstanding examples since then of how engineers are contributing to public well-being every day. Recently, engineers have been collaborating at an unprecedented pace with public health experts to help track and project the spread of COVID-19 and rethink our indoor environments, such as their ventilation systems and high-contact surfaces.

STAYING ATTUNED TO OUR NORTH STAR

I became an engineer because I wanted to be a part of a community that cared for others. I ran for PEO president because I wanted to help reimagine our North Star in a changing world. Today, we see the rapid changes around us, whether it is our climate, the opportunities and threats of our data-driven economy or the abilities to boost our economic productivity with artificial intelligence. The United Nations sought to synergize three core interconnected elements—environmental protection, economic growth and social inclusion—under the umbrella of sustainability. In 2015, world leaders agreed to 17 sustainable development goals (SDGs). You can read about them here: un.org/sustainabledevelopment. As part of UN Resolution 70/1 of the 2030 Agenda, it is intended that by 2030 the SDGs will be achieved and will bring a better and more sustainable future for all. Could the SDGs be a helpful framework for PEO to reimagine its North Star? In other words, what is the public interest that needs protecting now to form a better world in 2030?

You may be wondering if the global SDGs are outside of PEO's provincial mandate. I offer that although PEO regulates provincially, its impact and that of its licence holders is global. As engineers, we are constantly collaborating and partnering with others, whether it is someone down the street, in another province, across the border or around the world. And our connectedness to the world around us means that provincial land borders are artificial boundaries to the impact of PEO's regulation.

The pandemic has shown us that we all need to do our part to help our world. Viruses don't recognize land borders, and neither does public well-being. It will take a partnership between governments, the private sector and civil society to reach the SDGs. The Canadian government has embraced them. Does PEO need to also embrace the SDGs so it doesn't fall behind in protecting the well-being of Ontarians?

MODERNIZING FOR TOMORROW'S NEEDS

One could argue that PEO already does play a key role in achieving the SDGs. It licenses, enforces, disciplines, guides and co-regulates with government those people who develop reliable and affordable energy, provide access to safe water and sanitation and create effective and resilient transportation. Could PEO continue this work and expand its sights to ensure engineering work is more future ready—a "big tent" interpretation of the *Professional Engineers Act*? For example, how are the problem-solving skills that PEO assesses applicants for today supporting the development of engineering solutions that are reliable and resilient for tomorrow's climate, society, technology and resources? The United Nations predicts that the global population will grow to approximately 8.5 billion by 2030, and this growth will put pressure on the Earth's natural resources, climate and socioeconomic systems. Therefore, engineering solutions need to be flexible and adaptable to the substantial challenges that are expected.

How are PEO's guidelines and licensing requirements ensuring that engineers understand their intrinsic bias and learn how to keep it in check, such as when they are working with AI and designing software or algorithms? Diversity needs to be hard coded at the core of systems in order for them to work for everyone. How is PEO ensuring that its licensing system is providing Ontario with engineers who can truly represent the diverse needs of society today and into the future? Can PEO do more to review the licensing pathways for under-represented groups, such as Black, Indigenous and people of colour, much like it is currently doing under Engineers Canada's 30 by 30 initiative for women?

Lastly, how is PEO as a regulator providing the public the guarantee of protection they are looking for and inspiring public confidence to adopt new technologies? PEO licenses relatively few practitioners and has few standards of practice in the high-tech, constantly emerging and multi-disciplinary engineering disciplines such as software and nanotechnology.

The SDGs tell us that civil society wants a more inclusive, equitable and sustainable world. Reimagining PEO's vision aligned to the SDGs can continue to unite us and ready us for 2030. **e**

PRÉPARER L'AVENIR DE PEO

Par Marisa Sterling, P.Eng., FEC

S'il y a un objectif qui unit le monde pendant cette pandémie c'est que toute vie sur cette terre soit en bonne santé et en sécurité. Ceci comprend les vies de nos familles et amis, la santé de notre agriculture et systèmes alimentaires, la sécurité de nos logements et l'accès que nous avons les uns aux autres en ligne. Notre connectivité et notre interdépendance sont, aujourd'hui plus que jamais avant, évidentes alors que nous collaborons à travers le monde pour rester en sécurité. La pandémie nous montre la fragilité de nos existences et pourquoi il est primordial de protéger les intérêts et le bien-être du public.

Depuis sa création en 1922, PEO a unifié des ingénieurs et des détenteurs de licence et d'attestation par notre simple objectif de protéger l'intérêt public. Je considère cela comme notre étoile polaire. Depuis, il y a eu de nombreux exemples remarquables de la façon dont les ingénieurs contribuent au bien-être du public chaque jour. Récemment, des ingénieurs ont collaboré à un rythme sans précédent, avec des experts de la santé, pour aider à suivre et projeter la propagation du COVID-19 et repenser nos environnements intérieurs, tels que leurs systèmes de ventilation et les surfaces à contact fréquent.

RESTER EN PHASE AVEC NOTRE ÉTOILE POLAIRE

Je suis devenue ingénieure parce que je voulais être un membre de la communauté qui se souciait des autres. Je me suis présentée comme présidente de PEO car je voulais aider à ré-imaginer notre étoile polaire dans un monde en changement. Aujourd'hui, nous pouvons observer les changements rapides autour de nous, que cela concerne le climat, les chances ou les menaces de notre économie basée sur les données ou la capacité à stimuler notre productivité économique grâce à l'intelligence artificielle. Les Nations Unies ont cherché à mettre en synergie ces éléments fondamentaux interconnectés – la protection de l'environnement, la croissance économique et l'inclusion sociale - sous l'égide de la durabilité. En 2015, les dirigeants mondiaux se sont mis d'accord sur 17 objectifs de développement durable. (SDG). Vous pouvez les consulter ici : un.org/sustainabledevelopment. Dans le cadre de la résolution 70/1 de l'agenda 2030 des Nations unies, il est prévu qu'en 2030 les SDG seront atteints et apporteront un futur meilleur et plus durable pour tous. Ces SDG pourraient-ils être un cadre de travail utile pour que PEO ré-imaginer son étoile polaire ? En d'autres mots, quel intérêt public requiert d'être protégé maintenant pour former un meilleur monde en 2030 ?

Vous pouvez vous demander si les SDG globaux ne relèvent pas du mandat provincial de PEO. Je propose que, bien que PEO réglemente au niveau provincial, son impact et celui de ses détenteurs de licences est mondial. En tant qu'ingénieurs, nous collaborons et faisons des partenariats constamment avec les autres, que ce soit quelqu'un de proche, d'une autre province, de l'autre côté de la frontière ou à l'autre bout du monde. Et cette connectivité au monde autour de nous signifie que les frontières terrestres provinciales sont des limites artificielles à l'impact de la réglementation de PEO.

La pandémie nous a montré que nous devons tous participer pour aider le monde. Les virus ne reconnaissent pas les frontières terrestres ni le bien-être public. Il faudra un partenariat entre les gouvernements, le secteur privé et la société civile pour atteindre les SDG. Le gouvernement canadien les a adoptés. PEO doit-il également les adopter afin de ne pas prendre de retard dans la protection du bien-être des Ontariens ?

SE MODERNISER POUR LES BESOINS DE DEMAIN

On pourrait dire que PEO joue déjà un rôle clé dans la réalisation des SDG. Il émet des licences, fait appliquer, discipline, guide et co-régule, avec le gouvernement, ces personnes qui développent une énergie fiable et abordable, fournissent l'accès à l'eau potable et l'assainissement et créent des moyens de transports efficaces et résilients. PEO peut-il continuer cette mission et élargir son champ d'action pour s'assurer que les travaux d'ingénierie soient mieux préparés pour l'avenir – comme une interprétation de « grand chapiteau » du *Professional Engineers Act* ? Par exemple, comment sont les compétences de résolution de problèmes que PEO évalue les candidats d'aujourd'hui soutiennent-elles le développement de solutions d'ingénierie qui sont fiables et résilientes pour le climat, la société, la technologie et les ressources de demain ? Les Nations Unies prévoient que la population globale s'accroîtra jusqu'à approximativement 8.5 milliards en 2030 et cette croissance exercera une pression sur les ressources naturelles, le climat et les systèmes socio-économiques de la Terre. Par conséquent, les solutions d'ingénierie doivent être flexibles et adaptables aux défis importants qui sont attendus.

Comment les lignes directrices et les exigences de licences de PEO assurent-elles que les ingénieurs comprennent leurs préjugés intrinsèques et apprennent à les conserver, comme lorsqu'ils travaillent avec l'IA et qu'ils élaborent des logiciels ou des algorithmes ? La diversité a besoin d'être programmée en dur au cœur des systèmes afin que ceux-ci fonctionnent pour tout le monde. Comment PEO s'assure-t-il que son système de licence fournit à l'Ontario des ingénieurs qui peuvent réellement représenter les différents besoins de la société d'aujourd'hui et à l'avenir ? PEO peut-il entreprendre plus pour réviser les parcours d'émission de licence pour les groupes sous représentés, tel que les personnes noires et les peuples autochtones, comme il le fait actuellement dans le cadre de l'initiative canadienne « 30 par 30 » d'Ingénieurs pour les femmes ?

Enfin, comment PEO, en tant que régulateur, offre-t-il au public les garanties de protection que celui-ci recherche et inspire-t-il la confiance du public pour adopter de nouvelles technologies ? PEO émet des licences pour relativement peu de praticiens et a peu de normes de pratique dans les disciplines d'ingénierie de haute technologie, constamment émergentes et multidisciplinaires, telles que les logiciels et les nanotechnologies.

Les SDG nous disent que la société civile veut un monde plus inclusif, équitable et durable. Ré-imaginer la vision de PEO en phase avec les SDG peut continuer à nous unir et nous préparer pour 2030. **e**

PLANNING FOR THE NEXT NORMAL

By Johnny Zuccon, P.Eng., FEC



The COVID-19 pandemic has disrupted businesses in our province and around the world in unprecedented ways and forced many organizations—PEO included—to reassess its operations. The reality is, the way we respond to this crisis could have long-lasting effects on our operations and will certainly be key in defining our future state.

The optimist in me sees an opportunity to enhance and possibly accelerate our enterprise-wide transformation, which began prior to the onset of the pandemic, and re-evaluate the organizational business rules for many of our processes while asking: Are they still practical? Are they still relevant? Can they be simplified? In many cases, we have already developed workaround solutions that have made our remote work program viable. Now, we must assess the impacts of these workarounds to determine if the intended outputs are being delivered in the most effective and efficient way. If not, we need to find alternate solutions.

A SOCIALLY RESPONSIBLE APPROACH

Despite the challenges that this crisis has thrown at us, the most important lesson I've taken away is the reminder that people are at the heart of any business. I've seen countless articles highlighting how organizations are thinking more about the value and importance of corporate social responsibility—the way a company takes responsibility for its actions and their impact on employees, stakeholders and communities. PEO is no different. In fact, the health and well-being of our most important resources—our staff and volunteers—is paramount as we begin to develop a return-to-the-office protocol. Our intent is to take a cautious and socially responsible approach—one that other employers would be keen to emulate. We envision a phased return beginning with critical staff whose outputs have been negatively affected by a virtual work environment. We'll rely on medical expertise to determine when it's appropriate to return and on the guidance of an external vendor with expertise in this area to determine how we can do so safely. Needless to say, we expect our office environment to be much different when we return than when we vacated in March. This stage has been described by colleagues as the "next normal," since there seems to be a new normal with each passing week. No matter what you call it, the phase will be defined by how well prepared we are to adapt to new circumstances. Our resiliency will be tested again.

COMMITMENT TO CHANGE

I say this because we simply cannot revert back to how we operated before. Long before COVID-19, plans were underway for an enterprise-wide transformation. Our operational mandate was clear and, perhaps, the events of the



LONG BEFORE COVID-19, PLANS WERE UNDERWAY FOR AN ENTERPRISE-WIDE TRANSFORMATION. OUR OPERATIONAL MANDATE WAS CLEAR AND, PERHAPS, THE EVENTS OF THE PAST SIX MONTHS HAVE INDIRECTLY PROVIDED US WITH A NUDGE IN THE RIGHT DIRECTION.

past six months have indirectly provided us with a nudge in the right direction. For example, the need for us to follow a stay-at-home mandate has led us to new tools and technologies that have allowed us to work smarter. Turning telecommuting into long-term efficiencies in many cases is a natural progression in our effort to digitize and modernize our operations—redesigning our systems so they produce more efficient and timely returns. Such changes, combined with the uncertainty of the pandemic and its effects, inject an element of unpredictability in our 2021 budget-planning process and perhaps beyond.

GOVERNANCE ROADMAP

Over time, however, the outputs from Council's two-year governance roadmap will provide much-needed clarity and stability, which will cascade to the operational level and, ultimately, create a stronger and consistent PEO. I'm pleased that Governance Solutions Inc. has been retained to assist Council with this critical work. The outputs should provide PEO with the focus and direction necessary to ensure that all our discussions, actions and accountabilities are solely directed towards our role to serve and protect the public interest. I look forward to the results.

There is hope that long-term good for PEO can still emerge from this temporary crisis, provided we are willing to continue to embrace our path of change. **e**

THIS YEAR'S ONTARIO PROFESSIONAL ENGINEERS AWARD RECIPIENTS TO BE HONOURED IN 2021

By Marika Bigongiari

This year marks the 73rd anniversary of the Ontario Professional Engineers Awards (OPEA), but due to safety concerns associated with the COVID-19 pandemic, the awards gala that was set to take place this November has been postponed until 2021.

The OPEA program was founded by PEO in 1947 to recognize professional engineers in Ontario who have made outstanding contributions to their profession and their community. The awards recognize individual achievements in categories that include engineering excellence, research and development, entrepreneurship and young engineer, as well as those achieved by a team of engineers that has had a positive impact on society, industry and/or engineering. Award recipients are celebrated each year at the prestigious OPEA gala. In 2002, the OPEA became a joint program with the Ontario Society of Professional Engineers (OSPE). The two groups have been working together to come up with an alternative plan for this year's in-person celebration, where they had hoped to honour the 2020 OPEA recipients from the Ontario engineering community.

Both PEO and OSPE believe it's important to ensure the awards go ahead, even if it is delayed. "The OPEA program is an important aspect of the association because it highlights the exceptional engineers who work in Ontario every day and the high level of professional expertise within the province," says Ken McMartin, P.Eng., FEC, a former PEO president and current chair of the Awards Committee (AWC). The AWC solicits nominations and makes recommendations in recognition of technical excellence and contributions to society through the OPEA program. In working to regularly review such exceptional engineers, McMartin finds his many years as a volunteer on the AWC to be a humbling and uplifting experience. "From my perspective, having been involved with PEO for over 30 years as a volunteer and having held a significant number of positions within the organization, PEO gains a lot of respect by showcasing the award winners, and it shows the depth and breadth of the profession in Ontario," McMartin says. "The OPEA program, with its many categories, allows the profession to elevate itself up and away from the so called 'invisible profession.'"

The global pandemic has made this year a challenge for both the AWC and the OPEA program: The committee has had to pivot, including how it conducts meetings and the business of administering the program. "COVID-19 has pushed the committee to re-evaluate the awards program and to think outside the box in order to continue the programs," McMartin says. "The committee believed, along with others, that we could not go forward with a virtual event, because it would detract from the normally high-level event that is provided and expected." Instead, an in-person event will be held in November 2021.

2020 ONTARIO PROFESSIONAL ENGINEERS AWARD RECIPIENTS

Engineering Medal—Engineering Excellence

Goldie Nejat, PhD, P.Eng.

Professor and Canada research chair in robots for society, University of Toronto

Charles Michael Southwood, BSc, P.Eng.

Chief electrical engineer, Eastern Power Ltd.

Engineering Medal—Management

Laura Conquergood, BSc.Eng, P.Eng.

VP operations, Baylis Medical

Howard Goodfellow, PhD, P.Eng., FCAE, FEC

President and CEO, Goodfellow Business Enterprises

Engineering Medal—Research and Development

Pascale Champagne, PhD, P.Eng., DWRE, FASCE, FEWRI, FCAE

Professor and Canada research chair in bioresources engineering, Queen's University

Jing Jiang, BSc, MSc, PhD, P.Eng., FCAE, FEIC, FIET, FISA,

FIEEE, FANS

Professor and NSERC/UNENE senior industry research chair, Western University

Engineering Medal—Entrepreneurship

Jeff Westeinde, BSc, P.Eng.

President, Zibi Canada

Engineering Medal—Young Engineer

Yin Yu Rachel Zhang, BSc, P.Eng., CCE

Clinical engineer, Children's Hospital of Eastern Ontario

Award for Engineering Project or Achievement

National Arts Centre Rejuvenation

Ian Boyle, BSc, P.Eng.

Principal engineer, Fast + Epp

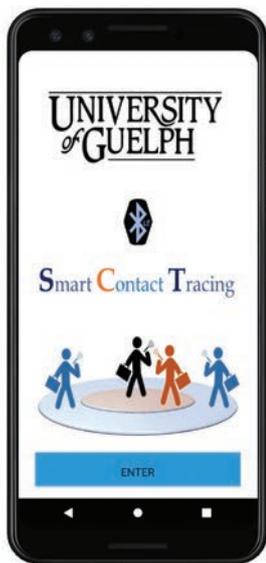
For updates and more information, visit www.opeakwards.ca.

ONTARIO ENGINEERS DEVELOP COVID-19 TRACKING APP

By Adam Sidsworth

A team of engineers from the University of Guelph (U of G) and University of Toronto have developed a smartphone app that allows people to find out if they are in close proximity to people who have tested positive for COVID-19. The new app protects people's privacy and reputedly improves on the apps being developed by the federal government and jurisdictions in the United States.

Petros Spachos, PhD, P.Eng., associate professor of computer engineering at U of G, along with Stefano Gregori, PhD, P.Eng., professor of computer engineering at U of G, and Konstantinos Plataniotis, PhD, P.Eng., professor of electrical and computer engineering at the University of Toronto, developed the Smart Contact Tracing smartphone app along with the app's lead author, Pai Chet Ng, an international student from Hong Kong University of Science and Technology, who is visiting U of G.



A screenshot of Smart Contact Tracing, an app developed by Ontario engineers to help curb the spread of COVID-19

Smart Contact Tracing is designed to alert users when people nearby are not maintaining a two-metre distance or have been infected with COVID-19. According to Spachos, the team's app is a marked improvement to other similar apps, including the federal government's similarly purposed COVID Alert app, a Bluetooth-based, open-sourced contact tracing app that had been scheduled to go live at the beginning of July but had its launch date pushed to July 31 because of unspecified bugs and other problems. "Imagine you have a smartphone in your hand and somebody else has a smartphone in their hand. They

can tell if they're two metres away, or three metres away or four metres away," Spachos explains. "Now, if you put your phone in your backpack, something is blocking the signal, and the information is really bad, so what happens is that if you're a 30-metre distance from your friend, it might say that you're five metres away."

Spachos says that Smart Contact Tracing solves that problem through improved machine learning. "We have an accuracy of 87 per cent," he says of the so-called hidden smartphone scenarios, compared to the 56 per cent it was before. Smart Contact Tracing also takes additional steps to make sure that users' privacy is protected. "We don't know where or who you are," Spachos explains. "We assign you a random number, and if you come close to each other, you exchange random numbers. When you get home, the person uploads their numbers to the government, and people who have that person's number [detected by their app] will know that they came within close proximity to this person."

Spachos elaborates that if his phone were assigned the number five and later that day he went to the hospital with symptoms of COVID-19, "eventually, whoever has the number five on their phone will be alerted, but you won't know who I am or where you came in close contact with me. The only thing you'll know is that you came within close proximity with somebody with COVID-19."

Smart Contact Tracing received funding from several sources, including \$20,000 from U of G's COVID-19 Research Development and Catalyst Fund and a \$50,000 Alliance COVID-19 grant from the Natural Sciences and Engineering Research Council of Canada. Additionally, the team's work was published in *IEEE Journal* this past summer. Yet Spachos notes that Smart Contact Tracing is unable to go live unless the government allows it access to COVID-19 data. "We've done experiments," Spachos says. "But due to government constraints, without their approval, we cannot access their health apps. In the meantime, the app works at the university."

Spachos asserts that his team remains in contact with government representatives and is hopeful that their app may be adopted by the government. Meanwhile, the Canadian Digital Service, the government agency tasked with delivering digital services, put out a call to the public on July 23 to have people sign up to test COVID Alert during its trial stage. The call was timely for Ontarians, who saw much of their province move to Stage 3 of the gradual reopening of the province's economy and mandatory physical distancing of people, which allowed, among other things, playgrounds to reopen, restaurants to resume indoor service and fitness centres to reopen, albeit with restrictions. Gathering limits also increased to 100 people outdoors and 50 people indoors. Given the increased physical contact in Ontario, Spachos and his team continue to work with Toronto, Ontario-based OMESH Networks to further develop Smart Contact Tracing.

PEO INTRODUCES NEW PEAK ETHICS MODULE

By Adam Sidsworth

PEO's Practice Evaluation and Knowledge (PEAK) program phased in an updated, more user-friendly ethics platform and module throughout the summer to more effectively engage members and holders of limited licences as they complete PEO's continuing professional development (CPD) program.

Beginning in July, PEO members would have noticed that the ethics module migrated to a new online platform that includes a new dashboard. Other platform improvements include easier navigation, clearer instructions and titles and descriptions for each module. Licensees will continue to be able to revisit modules at any time and contact the technical support team via the "help" button. Additionally, members and holders of licences will now be able to access the new online platform on mobile devices, including smartphones and tablets.

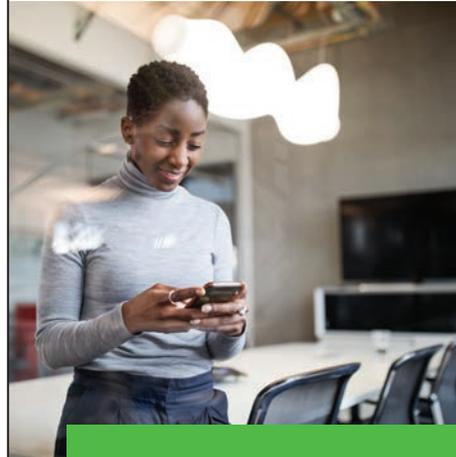
Additionally, a new ethics module was implemented in August. A new ethics module has been introduced every calendar year since PEAK began in 2017, and PEO expects to continue with yearly additions. As ethics modules accumulate, members are asked to complete one ethics module per year, and are able to review completed ethics modules at any time. According to Arden Heerah, P.Eng., PEO's PEAK program coordinator, this year's ethics module stands out because of the introduction of multiple interactive learning elements, such as video explainers, text-and-image sliders, flip cards, text-and-image exposure and questions and answers designed to more actively engage members as they complete the module. "The first three modules have been described as using a passive learning delivery format, whereas the new 2020 module has a much more active learning delivery," Heerah says.

PEAK is a yearly CPD reporting mechanism that engages eligible PEO licensees, including professional engineers and holders of limited licences to complete an online practice evaluation, along with an online ethics module. Upon completion, practising members are advised to pursue continuing knowledge activities with engineering content during their licence year and report those completed activities to PEO. PEO could recommend up to 30 hours of continuing knowledge activities every year, and this amount is personalized to the licensee according to the PEAK practice evaluation. Non-practising members complete only the ethics module and a declaration that they are not practising. Although PEAK remains voluntary, the successful completion of PEAK is noted on members' profile in PEO's public directory of PEO-licensed engineers.

The PEAK team is available to guide members through the PEAK process by phone at 416-224-1100, by email at peopeak@peo.on.ca or through the PEAK webpage at peopeak.ca. Requests for PEAK information materials and seminars can be submitted by phone or email.



TD Insurance | Ready
Meloche Monnex | for you



**Feel confident
with preferred
rates from
TD Insurance.**

Professionals could save on
car, home, condo and tenant's
insurance.

**Get a quote and see how much
you could save!**

Go to tdinsurance.com/melochemonnex

The TD Insurance Meloche Monnex home and auto insurance program is underwritten by Security National Insurance Company and distributed in Quebec by Meloche Monnex Insurance and Financial Services Inc., Damage Insurance Agency, and in the rest of Canada by TD Insurance Direct Agency Inc. Our address: 50 Place Crémazie, 12th Floor, Montréal, Québec H2P 1B6.

Due to provincial legislation, this car and recreational insurance program is not offered in British Columbia, Manitoba or Saskatchewan.

© The TD logo and other trademarks are the property of The Toronto-Dominion Bank or its subsidiaries. 8249-0320

NEW ENGINEERS CANADA PRESIDENT FOCUSES ON STRATEGIC PLAN

By Adam Sidsworth



Jean Boudreau, P.Eng. (New Brunswick), FEC, ran for the Engineers Canada presidency on a platform of accreditation, self-regulation and diversity.

The new president of Engineers Canada, the nation's umbrella organization of provincial and territorial engineering regulators, is vowing to continue the implementation of the organization's 2019–2021 Strategic Plan in light of the challenges brought by the COVID-19 pandemic.

"Given the current (and changing) situation with COVID-19, Engineers Canada, along with everyone else in the world, has to juggle how they function and how to move forward," says Jean Boudreau, P.Eng. (New Brunswick), FEC. "I think it's safe to say that the definition for success for this year has been revised a little, not only to continue functioning on a daily basis but also to continue to meet our original goals in our current strategic plan."

Boudreau, who was named Engineers Canada's president in May, is a New Brunswick engineer with over 30 years' experience in civil engineering, highway planning and design and civil construction projects, with the largest part of her career for the last 25 years focusing on highway and hydraulic structures design projects. Boudreau is a senior engineer and consultant with GEMTEC Limited, an employee-owned multidisciplinary engineering company with offices and laboratories across Ontario, Quebec and the Maritime provinces. Boudreau served on the council of Engineers Geoscientists New Brunswick from 2009 to 2014, including as its president in 2012.

ENGINEERS CANADA'S 2019–2021 STRATEGIC PLAN

Engineers Canada's current three-year strategic plan has four focuses: the development of Engineers Canada's Accreditation Improvement program, with an aim to improve the logistics and workload associated with the accreditation process for university engineering programs; to improve the accountability of the Canadian Engineering Accreditation Board (CEAB) through evidence-based transparency to the Engineers Canada board, engineering deans and provincial and territorial regulators; increased recruitment, retention and professional development of women in the engineering profession through strategic support to champion groups representing key points on the pathway to engineering; and the funding of a competency-based assessment framework for licensure to be made available to all provincial and territorial engineering regulators, with the end goal of

developing a nationwide harmonization between regulators. The pillars were initially championed by Engineers Canada Past President David Lynch, PhD, P.Eng. (Alberta), FEC, who, in 2019, while serving as president, stated in an interview with *Engineering Dimensions* that "the goals of the president have to be aligned with the strategic plan of Engineers Canada" (see "Engineers Canada swears in new president at annual meeting," September/October 2019, p. 14).

Indeed, Boudreau, as Engineers Canada's current president, seems dedicated to continuing the spirit of the strategic plan, stating on Engineers Canada's website in July: "My campaign speech to the board just before the election centred on accreditation, self-regulation and diversity. Those are still my main focus points, and they are also very important issues for the regulators. That much was obvious in the presidents' reports that were presented at the annual meeting of members both last year and this year." Boudreau added: "While I want to do everything I can, I also know that it takes time to move things forward. We may not be able to say we have completely resolved these issues in one year's time, but I would be happy to know that we've moved them further along."

CEAB ACCOUNTABILITY STRATEGY MOVES FORWARD

Engineers Canada is moving ahead on two of its above-mentioned strategies. In June, it rolled out a new Accountability in Accreditation Evaluation Strategy after the CEAB received a report from its Accountability in Accreditation Committee (AAC), which consulted with stakeholders from across Canada to get their thoughts on the current accreditation system and indicators for trust, transparency and efficiency. The CEAB accredits undergraduate engineering programs in Canada on behalf of the provincial and territorial engineering regulators and is run by Engineers Canada. "In the end, it is all about improving trust and transparency," CEAB Chair and former PEO president Bob Dony, PhD, P.Eng., FEC, says. "The work we've done will put continual improvement at the heart of our accreditation system."

IMPROVING RELATIONSHIPS

In the meantime, Boudreau remains committed to improving the functionality of the Engineers Canada board and Engineers Canada's relationships with its member regulators. "When I first came

on the board, there was a lot of concern/discontent/frustration that Engineers Canada was straying away from the work that the regulators thought was important," Boudreau says. "Engineers Canada wasn't listening to its owners and was veering off in its own direction at the time. My first meeting was a board workshop, and there was a lot of negativity and frustration in the room." However, Boudreau maintains that because of the efforts of Engineers Canada staff and volunteers, the organization's relationship with its member regulators has improved.

PEO is currently represented on the Engineers Canada board by five members: PEO Past President Nancy Hill, P.Eng., LLB, FEC; PEO President-elect Christian Bellini, P.Eng., FEC, who will assume PEO's presidency in May 2021; Kelly Reid, P.Eng.; Changiz Sadr, P.Eng., FEC; and Danny Chui, P.Eng., FEC, Engineers Canada's president-elect, who will take over Engineers Canada's presidency next year.

BITS & PIECES



Microgrids are smaller local energy grids that can operate both independently and as part of a larger network. They often utilize various forms of energy generation, including renewable energy, which makes them efficient energy tools. Their ability to operate autonomously is useful in critical times, such as during storms, providing communities, including remote areas, with energy independence. Photo: Oak Ridge National Laboratory

UNIVERSITY OF TORONTO GRADUATE WRITES AWARD-WINNING THESIS ON DIVERSITY AND REPRESENTATION IN ENGINEERING EDUCATION

By Adam Sidsworth

A University of Toronto (U of T) graduate of engineering science was awarded the Best Paper award in the women in engineering division at the American Society for Engineering Education Virtual Conference (ASEEVC) for her fourth-year graduation project that explored the attitudes and experiences of women undergraduate students studying machine learning/artificial intelligence (ML/AI) at U of T. The conference was scheduled to be held in Montreal, Quebec, from June 21 to June 24, but was converted to a virtual event due to the COVID-19 pandemic.

Kimberly Ren, who graduated from U of T in the spring, wrote a fourth-year thesis titled "Gendered professional role confidence and persistence of artificial intelligence and machine learning students," which was supervised by Alison Olechowski, EIT, assistant professor of mechanical engineering in U of T's department of mechanical and industrial engineering and the Troost Institute for Leadership Education in Engineering. Ren's paper addressed the lack of diversity of groups such as women in ML/AI with the underlying hope of "understanding the early decision-making of women that prevents them from joining ML/AI workforce...to advise future educational practices that can improve representation of women in the field." Ren had discovered in her reading that only 22 per cent of global AI professionals are women, compared to the 78 per cent who are men, with women oscillating



Kimberly Ren, who graduated from the University of Toronto earlier this year, wrote an award-winning thesis that quantified predictors for persistence of women in ML/AI programs.

between 21 and 23 per cent in the previous four years. However, at U of T, Ren's research found that as many as 38 per cent of ML/AI students identify as women.

"The main premise of our paper is that we wanted to look at what factors affect persistence in engineering, specifically ML/AI engineering," Ren explains. "Through our literature review, we found that professional role confidence, which is defined as a combination of career confidence and expertise confidence, is shown to be a predictor. We added technical confidence, which includes specific technical knowledge related to ML/AI that aren't in those first two." Career confidence, Ren explains, answers the question, "Is ML/AI the right career for me?" Expertise confidence can be defined by asking, "Have I learned what I need to succeed in an ML/AI career?" And technical confidence is related to things specifically related to ML/AI, such as programming skills and probability and statistics knowledge.

Ren focused specifically on U of T's ML/AI students at Olechowski's suggestion because of the large number of students studying there. "We

ended up getting 279 students responding, which speaks to how many people were in the stream,” Ren explains. “Also, U of T is a unique place; there is such a focus on ML/AI.”

REN’S RESEARCH FINDINGS

Based on her survey of students, Ren’s research found that “the experienced discrimination from peers was significantly greater in women than in men. It is important to note that this is prevalent even in educational institutions with higher representation of women in the general population. This indicates that simply increasing the percentage of women in the program is not effective at eliminating discrimination.” Ren’s paper also discovered that “discrimination from teaching staff was a significant negative predictor of intentional persistence for women in engineering. To increase persistence of women and, ultimately, representation in the workforce, it is important to address discriminatory behaviour of the university teaching staff targeted at women.”

Ren also discovered that among those students she sampled, 84 per cent identified as a visible minority, but Black students accounted for only 2 per cent of students, while Indigenous students accounted for none of the respondents. Yet respondents who identified as Chinese accounted for 51 per cent of total respondents. The lesson for Ren was not to view any marginalized group in ML/AI as one group: “It’s clearly subgroups of people who come from very different places and have very different experiences and who can’t be addressed with one overarching strategy,” she says. “There needs to be research and looking into specific groups. There might be something done for each of them, but that really hasn’t been studied.” Indeed, in her report, Ren noted that “the student population has a significant ethnic diversity, which could be a contributing factor to the unique findings of the study.”

REN OFFERS SOME RECOMMENDATIONS

Ren says that universities can focus on certain areas to help increase persistence of women in the ML/AI profession. Among Ren’s suggestions are that universities:

- Hire more women in ML/AI faculty positions;
- Offer mentoring opportunities within ML/AI and academia to give students more expertise confidence;
- Provide opportunities to participate in design teams and engineering societies; and
- All volunteer and co-curricular opportunities are held responsible for equity and diversity inclusion initiatives.

THE IMPLICATIONS OF REN’S FINDINGS

For Olechowski, Ren’s research shows that there is much to be done at university engineering faculties not only at U of T but across Canada in terms of both studying and providing solutions to discrimination against women engineering students and increasing professional role confidence for women and other marginalized groups within engineering education. “I think there are two next steps,” Olechowski says. “One is to start acting on what Kimberly found, to really ask our faculty members about these different teaching opportunities they’re providing our students to increase professional role confidence—so mentoring, co-op programs or panels. Kimberly also had some disappointing results in that discrimination is real and is a big dissuasive factor from preventing women from pursuing ML/AI, and that’s something we need to look at. There are things that we can change [at U of T], but we should also expand this across Canada.”

Olechowski says that as an engineering educator herself, Ren’s research has helped her think about how she approaches education: “What Kim’s work found is there’s this importance of professional role confidence in the persistence of students, which is linked to your experiences and exposure to the profession itself,” Olechowski explains. “And what that inspired in me was reflection on what we teach students beyond algorithms. Who do we choose to talk about when we highlight different researchers? If we do a career panel, who from the profession are we inviting? Who feels like they belong, like they’re represented, and who feels like they’re left out? Also, reflecting on my own faculty, something that Kim found when she surveyed the students at the University of Toronto, all of the faculty that she spoke to about surveying their students were men. All the [teaching assistants] were also men. In a way, I also think that it’s something we need to work on when we signal to our students that you belong in the profession.”

BITS & PIECES



Using a modified form of diphtheria toxin, researchers from the University of Toronto and SickKids Hospital, led by professor Molly Shoichet, PhD, LEL, have developed a novel method of delivering molecules that target specific genes inside cells. The novel technique facilitates a means of escaping the acid environment of the cellular endosome to deliver RNA therapeutics where they are needed. Photo: Natalieconstancehall

RESOLVING DISAGREEMENTS INVOLVING THE USE OF THE PROFESSIONAL ENGINEER'S SEAL

By Jennifer Whang, P.Eng., PMP

One of the most frequent questions that PEO's practice advisory team receives involves the appropriate use of the professional engineer's seal, specifically what documents need to be sealed and by whom. For example, in some complex engineering projects, due to division of labour and specialization, there may be several different engineering documents prepared by or checked by different engineers. Consequently, in order to avoid disagreements involving the use of the seal, practitioners need to plan early to determine what documents need to be sealed and which engineer or engineers will assume responsibility for which document.

CONFLICTING OBLIGATIONS: CONTRACTUAL VERSUS STATUTORY

Under the *Professional Engineers Act* (the act), specifically section 53 of Regulation 941, practitioners have a statutory obligation to affix their seals on final engineering work that they either prepared or reviewed. However, sometimes practitioners are put in situations where their contractual obligations might conflict with their statutory obligation to seal. For example, some contracts might state that engineers must seal certain non-engineering documents or documents that they did not review.

In these situations, practitioners should note that sealing documents should never be a contractual obligation in the first place (see "How practitioners can prevent conflicting obligations," *Engineering Dimensions*, March/April 2018, p. 21). It is in the interest of practitioners to avoid being placed in a position where their contractual obligations are not consistent with their statutory ones. These situations can be prevented by having early discussions with clients and by drafting clearly worded agreements that are consistent with practitioners' statutory obligations.

WHEN AUTHORITIES REQUEST SEALED ENGINEERING DOCUMENTS

It is not unreasonable for authorities to adopt a policy that relies on the expertise of professional engineers. Consequently, authorities, such as city building departments, often request that clients provide professional engineering drawings or reports before issuing a permit or an approval. However, requesting that a client provide a document sealed by a professional engineer is not the same thing as requesting that a practitioner seals a specific document, since the use of the seal is a statutory obligation for the practitioner, and therefore

it is the practitioner who should decide if a document must be sealed or not by referring to PEO's practice guideline *Use of the Professional Engineer's Seal* (peo.on.ca/sites/default/files/2019-10/UseofProfessionalEngineerSeal.pdf). Nonetheless, when an authority makes a request for sealed engineering documents, it is because the work likely falls within the practice of professional engineering, and therefore these documents must be approved and sealed by a practitioner as per the requirements of section 53 of O.Reg. 941.

For example, often structures such as modular greenhouses installed in Ontario are designed and manufactured elsewhere, such as the United States. While it could be argued that small residential design projects are exempt in the act, the act does not actually exempt structural condition assessment reports for these projects, so it is reasonable for a building official to request that a client provide a structural condition assessment report prepared and sealed by an Ontario engineer. The use of an engineer's seal is a matter of professionalism and not an independent source of civil liability. The failure to abide by section 53 of O.Reg. 941 constitutes professional misconduct under section 72(2)(g) of O.Reg. 941. Consequently, when in doubt, engineers are better off affixing the seal than withholding it.

DISAGREEMENTS BETWEEN DESIGN ENGINEERS AND CHECKING ENGINEERS

There may be situations where there is a disagreement between the practitioner who is responsible for preparing a design and the practitioner responsible for checking the work: Which one should seal the drawing? For instance, Marcus, an experienced engineer in water resources, designs the flood maps for a project. Julia, a more senior engineer and an expert in water resources, is assigned to check the design and agrees with Marcus's proposed methodology. Julia informs Marcus that after completing the checking, she has no concerns but states that it is Marcus who should seal the flood maps, since it is his design. Marcus disagrees, noting that it is Julia who checked the maps, and so she should seal them since she is more senior.

Section 53 states: "Every holder...shall sign, date and affix the holder's seal to every final drawing, specification, plan, report or other document prepared or checked by the holder as part of the service before it is issued." Therefore, it could be reasonably argued that both Julia and Marcus should seal the flood maps. For clarity purposes, Marcus could write a note next to his seal that he is assuming responsibility for the design, while Julia could write a note next to her seal that she is assuming responsibility for checking the design.

To avoid disagreements of this nature, practitioners should encourage their employers to have clear approvals processes that are consistent with PEO's practice guidelines, especially *Use of the Professional Engineer's Seal* and *Assuming Responsibility and Supervising Engineering Work* (peo.on.ca/sites/default/files/2019-11/Assumingresponsibilityandsupervisingengineeringworkguideline.pdf). [e](#)

Jennifer Whang, P.Eng., PMP, is PEO's standards and guidelines development coordinator.



NEW PRESIDENT STAYS OPTIMISTIC amid paradigm shift

Marisa Sterling, P.Eng., FEC, PEO's 101st president, is stepping up to lead the organization through an unprecedented time in its history—and her goal is to “reimagine PEO together” by advocating for diversity of thought and the needs of society.



Although Marisa Sterling, P.Eng., FEC, is in familiar territory in many ways, she has taken the wheel at an unprecedented time in PEO's—and the world's—history, as the COVID-19 pandemic hit just as she was about to begin her year-long term as PEO president. Sterling's PEO roots run deep: This past year, she received her 20-year service pin to mark two decades of volunteer duty with the regulator and once worked at its headquarters. In fact, she grew up with professional engineers on both sides of the family, including her late father, G. Gordon M. Sterling, P.Eng., who was PEO president from 2001 to 2002, making this PEO's first father-daughter presidential legacy. Coming full circle, she picks up the reins of an organization that has woven itself into the fabric of her life, and yet, in the midst of uncertain times driven by the pandemic, she has also embarked on a path through largely unknown territory. Sterling's presidency has been marked by change, flexibility and resilience.

A PERSONAL JOURNEY

Sterling's engineering journey is a deeply personal one. After graduating from the chemical engineering program at the University of Toronto (U of T) in 1991, she became licensed by PEO in 1993 and was presented with her licence certificate by her father, who was then-chair of the Willowdale-Thornhill Chapter. “I got my licence certificate with my whole family present, with engineers on both sides of the family,” she recalls. Sterling's father and maternal uncle, Nino Campitelli, P.Eng., FEC, are also U of T alumni and introduced her to the profession and volunteerism. “My father was chapter chair at the time,” Sterling says. “I was alongside my father when he was a PEO volunteer, regional councillor, chapter chair, PEO president and Engineers Canada president. I was alongside him with my family during his entire volunteer journey.” For Sterling, it's not as much about following in her father's

..... BY MARIKA BIGONGIARI

footsteps as it is about being inspired by him her entire life, along with her mother and sisters. "It's sad to not have him be here throughout the entire journey, but at the same time, he's never not here," she says. "He's always with me."

Although Sterling found inspiration in her family ties, she was largely drawn to engineering because it is a profession. The idea of serving the public through technology also appealed to her, and as someone with a keen sense of serving the greater good, she was intrigued by the profession's stress on ethics. "It spoke to one of my core beliefs, which is to care about society and humanity as a whole," she explains. Thus far, Sterling has enjoyed her distinguished career, which has included serving as the president of the Ontario Professional Engineers Foundation for Education, working in the consumer products industry in research and development and brand management—where she launched a patent application and numerous new products—and her current role as the assistant dean and director of diversity, inclusion and professionalism at U of T's faculty of applied science and engineering. Sterling also has a long list of awards for her dedication to engineering and volunteerism: She was recognized with a U of T Arbor Award in 2015 and the Engineers Canada Meritorious Service Award for Community Service in 2016, and she was named a Woman of Distinction by the Canadian National Exhibition Association in 2016, made a fellow of Engineers Canada in 2017 and received the Canada 150 Heritage Pin in 2018.

In the wake of her father's sudden passing in 2007, it was the PEO community that encouraged Sterling to get more involved and consider working for the regulator. She embraced the idea as an opportunity to learn more about her father and the profession they both loved. "I

Difficulty aside, she quickly recognized that the world is living through a paradigm shift, and after letting go of her expectations, she welcomed the opportunity for change. "I fully embrace the way I'm coming into this presidency and hopeful about how I can help PEO through this next year," she says.

thought, by working at PEO, not only could I become more engaged with my profession, but I could also learn more about my father through people who knew him in a way I wouldn't have as a daughter," Sterling explains. She took a paid position supporting PEO's chapters before eventually moving to the enforcement department. Sterling, who was trained as a certified investigator by the Council on Licensure, Enforcement and Regulation, facilitated a complete restructuring of the enforcement department to enhance efficiency and broaden PEO's enforcement reach, including creating the position of

manager, which she assumed. She also led the strategic implementation of PEO's efforts on the repeal of the industrial exception, outreaching to companies to help them better understand the *Professional Engineers Act* (PEA) and encourage them to come into proactive compliance.

Sterling notes the support given to her family by the PEO volunteer community after her father's passing: "They showed up," Sterling says. "They came to his funeral. They reached out to my family. They supported us, and they helped to create the Sterling award in my dad's honour." Sterling spearheaded the creation of PEO's G. Gordon M. Sterling Engineering Intern Award to celebrate young engineering leaders and to honour her late father's memory. "Engineering students, engineering graduates and engineering interns (EITs) are the next generation of licence holders of PEO, and they play an important

role—they perform an important function in society," she explains. "But as important as it is to focus on our licence holders, we need to also focus on the future. We must impart best practices in terms of what helps people succeed. Leadership is an extremely important piece, and it is sometimes harder to access for young people. My father believed it, and I strongly believe it—and PEO shows its support every year by giving out the Sterling award in order to give those opportunities to EITs." Sterling believes in focusing on the future and on the young people who will keep PEO relevant; she recognizes that it is new ideas and the voices of a new generation that will keep PEO connected to the needs of society.

COVID ACCELERATES THE PACE

There is perhaps no better marker of strength than resilience, and Sterling's presidency has already been put to the test. Pandemics have a history of forcing change, and although PEO was already poised to make changes to meet the recommendations outlined in its 2019 external regulatory review, COVID-19 has accelerated the pace—beginning with Sterling's presidency, which has stood apart from the start. Sterling, who has attended many PEO presidential installations over the years, including her father's, expected hers to happen in the way she had imagined, but her flexibility was tested early in the form of a delayed installation at a rescheduled, virtually held annual general meeting (AGM)—the first in PEO's history—on May 30.

With much of the world on lockdown and the Province of Ontario under a state of emergency, the early days of her presidency were—and still are—conducted from a makeshift office in her dining room. "Change is hard for everybody, no matter how progressive we are or how we try to be, and initially I struggled with that change—with the idea that my presidency would look so different than any of my predecessors," Sterling says. Difficulty aside, she quickly recognized that the world is living through a paradigm shift, and after letting go of her expectations, she welcomed the opportunity for change. "I fully embrace the way I'm coming into this presidency and hopeful about how I can help PEO through this next year," she says.

Despite a presidency that looks very different from the one she had envisioned, Sterling is keen to lead the organization forward. As someone who holds equity, diversity and inclusion and a strong sense of community among her core values, she may be especially well suited to take the helm at a time when the world is shining a light on the many inequities that exist within it. In her current role at U of T, Sterling is tasked with ensuring diversity, inclusion and professionalism



are reflected in the educational curriculum and student experience. She makes a point of speaking out in the face of inequity and does not hesitate to do so on record. In a letter to the editor that was published in the March/April 1999 issue of *Engineering Dimensions* in response to two stories about up-and-coming engineers, Sterling questioned why the women being profiled were presented in a stereotypically sexist way: “Why did the female engineers’ photos show them with family, outdoors in a pensive state, under soft lighting or in a non-descriptive way, while the male engineers’ photos showed them in an office environment, in front of computers or wearing a hard hat with machinery in the background? Have we not progressed beyond these blatant stereotypes of the roles of men and women in the profession?” And she made an immediate impression as PEO president by presenting her President’s Message column (p. 6) in both English and French, cementing the first days of her presidency with a tone of inclusivity.

THE VALUE OF DIVERSITY AND TEAMWORK

Sterling’s vision for a reimagined PEO is very much a team effort. She strongly believes in working with others, and her sense of teamwork and determination to engage stakeholders are her driving forces as she steers the organization through long-overdue change. “PEO’s Council and staff are a team and so are those we serve,” she explains. “We must reimagine PEO together. Our collective wisdom is key.”

Sterling’s core values of diversity and teamwork are apparent in every facet of her professional life. “The engineering profession has a duty to the public, and the public in Ontario is a very diverse group of individuals, whether by their demographics, socio-economic status, level of education, the type of work they do or their family unit,” Sterling says. “Licence holders and engineers must be representative

of the public we are here to serve and must protect public well-being, especially for marginalized communities, as well as further a nation-to-nation relationship with Indigenous Peoples in our province.” Although this concept is not unique to engineering, Sterling believes it is one the profession must embrace in order to better recognize and respect one another, identify gaps and create solutions that are beneficial for all.

Like many engineers, Sterling respects an evidence-based approach and points out that the concept of including as many voices as possible is based on solid research. “If you look at any group, such as the engineering profession, what’s important is to have knowledge and make knowledge-based decisions,” she says. “Do we represent the Ontario public? Until we collect the data, including its intersectionality—demographic data, broader gender data, race-based data, disability data and more—we won’t know if we can answer that question. When we collect that data, we’ll be able to make evidence-based changes to public policy and our strategic directive. We’ll know what we need to do next if we see we’re not representing the public. Today, because we collect binary gender data, we know we don’t represent women proportionately. Women make up 50 per cent of the population, but they don’t represent 50 per cent of PEO’s licence holders. That is one place to suggest that this is an important priority because we know that we don’t hit the mark in that area—and it’s why the [Engineers Canada-led] 30 by 30 goal is so critical to shifting culture and change.”

ENGAGING THE PUBLIC

Sterling maintains that PEO needs to stay in touch with the voices of the public more directly in order to understand which social issues are most important and then determine whether the organization is playing its role as necessary to protect the public interest. She suggests that finding better ways to engage with the public to find out what concerns they have regarding their safety and security, for example, will help PEO refocus where its attention is needed, so it can be a more agile regulator. “What’s the role of PEO? If its mandate is the protection of the public interest, reimagining PEO could be identifying those top of mind, critical, widespread public concerns, such as data security or climate change, and where professional engineering work is involved, identifying what PEO needs to do to ensure it’s stewarding policy, practice and licensing as defined under the *Professional Engineers Act*,” Sterling says. The focus, she says, should be on the public issue as opposed to looking at regulating a practice such as software engineering or computer engineering. “It’s not that we wouldn’t be regulating those practices but rather stemming our focus on regulation from a public policy concern versus thinking about the disciplines of engineering; the focus is on the public policy perspective first, especially since engineering

disciplines often overlap and are constantly evolving. PEO and engineers won't have all the answers to solving these societal issues, but they have a key part to play in them."

If PEO breaks it down by understanding the public policy issue—understanding the practice of professional engineering and where it comes into play—then the regulator can determine if it's doing its best to regulate in the public interest. "Does that mean we need to produce more standards? Does it mean we need to ensure there are licensed individuals in broader fields of work? Does it mean we need to better define what professional engineering practice is within a given social issue so companies and organizations and government know engineers must hold those types of jobs?" Sterling asks. "We must define the practice—take the act's definition and explain what it means in each particular situation—and define what kind of work requires licence oversight, making sure we're licensing competent individuals in these areas. Because we must be able to ensure we're providing the licence holders that are needed for this work, all with the ultimate goal of public protection."

Such an approach could be taken in many areas where PEO is not fully present, such as the development and application of artificial intelligence and autonomous vehicles, when considering what PEO must do in order to fulfill its public protection mandate. "I don't believe the goal is to bring more people into PEO or expand its reach," Sterling says. "It's about fulfilling what the act already defines for us." According to the PEA, the practice of professional engineering is defined as any act of planning, designing, composing, evaluating, advising, reporting, directing or supervising that requires the application of engineering principles and concerns the safeguarding of life, health, property, economic interests, the public welfare or the environment, or the managing of any such act. "Professional engineering is the novel use of science to protect public well-being. Any work that meets that definition falls under the practice of engineering today, so we're not talking about expanding into new areas or changing any of that," Sterling points out. "What we would be doing is allowing ourselves to continue to question within this scope: Are we fulfilling our mandate? Is there more we need to be looking at? By considering different perspectives, it will allow us to fulfill that scope."

Sterling encourages diversity of thought, viewing it as an opportunity to see things in different ways. "It can only be helpful for PEO to look at its role from different perspectives," she explains. If the primary way to look at PEO's role today is by engineering discipline, she asserts that there's no need to walk away from that. "But an additional way of looking at how we deliver on our mandate is by looking at public policy and public need," she says. Sterling invites an active discussion on the topic, along with other frames the regulator might look through. "I'm suggesting there are potentially multiple frames, and the more diverse ways we look at how we regulate the profession, I think we'll do a better job, because diversity of thought brings better results," she points out.

LOOKING FORWARD TOGETHER

Sterling is setting the tone of her presidency as a modern, effective, results-driven leader—one that builds community between PEO leaders and licence holders and between the regulator and the public. She is stepping up to take the regulator on its journey from the old way to the new,



engaging key stakeholders along the way and putting their interests first while rising to the challenge of leading the organization through fast-paced technological change in an uncertain world.

Looking ahead, Sterling is focusing on three areas: continuing to progress on PEO's action plan, making progress on the governance roadmap Council has adopted and developing a clearly articulated 10-year strategic vision for the organization. "To achieve those three things this year would make me very proud, and I recognize it's very ambitious," Sterling says. "I think a healthy organization looks at itself and is very humble in seeking to understand where it can do better in the current paradigm, and PEO is doing that, but that work needs an overlay—a strategic vision for the future, so we don't just refine ourselves in the current paradigm but set ourselves up for success in the future paradigm. We're already in that future paradigm. The global pandemic pushed the future paradigm on PEO along with the whole world. It has demonstrated how important it is to always keep an eye on the future, because sometimes that timeline is much faster than we expected. It underscores the importance of having a long-term vision to be an effective organization." **e**

SUMMARY OF DECISION AND REASONS

In the matter of a complaint regarding the conduct of MICHAEL A. SCHOR, P.ENG., a member of the Association of Professional Engineers of Ontario, and M.A. STEELCON ENGINEERING LIMITED, a holder of a certificate of authorization.

This Discipline Committee hearing took place on May 18, 2018, and the panel issued its Decision and Reasons on August 15, 2018. Counsel for the association was Leah Price, and counsel for Mr. Schor, and Steelcon was Larry J. Levine.

AGREED STATEMENT OF FACTS

The parties submitted the following Agreed Statement of Facts:

1. Schor is a professional engineer licensed pursuant to the *Professional Engineers Act*. Schor's training and experience are primarily in the field of structural engineering.
2. Steelcon was incorporated in Ontario in or about 1981. At all material times, Steelcon held a certificate of authorization (C of A), and Schor was the individual taking responsibility for the engineering services provided under the C of A. Steelcon's business operations included structural engineering services.
3. Schor and Steelcon have been previously convicted of professional misconduct. Attached as Schedule "A" is a copy of the decision of the Discipline Committee dated December 13, 2004, as published in the Gazette. As part of the penalty in that case, Schor and Steelcon were required to submit a written undertaking to ensure "that all documents and drawings be appropriately complete and detailed."
4. The complainant, Paul Wohlgemuth, P.Eng., was, at all material times, a professional engineer licensed in Alberta and employed by Syncrude Canada Limited in Fort McMurray, Alberta.
5. In or about March 2010, CHEP Equipment Pooling Systems retained Stelfab Niagara Limited (Stelfab) to fabricate a Bin Lift System (the device) for its customer, Syncrude Canada Limited.
6. The device was intended to be used to hold loaded bins. The intention was to have an overhead crane lift the device (together with the loaded bin) about 150–200 feet. Attached as Schedule "B" is a concept drawing of the device.
7. Stelfab retained Steelcon and Schor to create engineering drawings for the device. Schor signed and sealed a drawing dated April 2010, a copy of which is attached as Schedule "C". This drawing was revised by a signed and sealed drawing dated May 26, 2011, and again revised by a signed and sealed drawing dated June 30, 2011 (the drawing). Attached as Schedule "D" is the drawing. Attached as Schedule "E" is a memorandum setting out the design weight (7700 lbs.), and a description of the drawing revisions, their purposes and dates.
8. Fabrication of the device was completed by Stelfab on or about July 18, 2011. Attached as Schedule "F" is a copy of the Stelfab Work Order Checklist showing the dates of the drawing revisions (May 26, 2011 and June 30, 2011) and the job completion date (July 18, 2011). Attached as Schedule "G" is a copy of Stelfab's certification dated July 18, 2011, certifying that the device "has been manufactured according to supplied drawings," and that it "is ready for use." Attached as Schedule "H" are two photographs of the completed device.
9. The device was delivered to Syncrude in or about September 2011. However, it was never put into use. Concerns were raised by Syncrude employees in the field about whether the device met the applicable code and the Syncrude site specific lifting standards. Syncrude's engineers subsequently did their own assessment and concluded that the device was not safe for use. Accordingly, it was rejected, and was eventually picked up by, or returned to, CHEP. Wohlgemuth filed his complaint in February 2012.

ENFORCEMENT HOTLINE Please report any person or company you suspect is practising engineering illegally or illegally using engineering titles. Call the PEO enforcement hotline at 416-224-1100, ext. 1444 or 800-339-3716, ext. 1444. Or email enforcement@peo.on.ca. Through the *Professional Engineers Act*, Professional Engineers Ontario governs licence and certificate holders and regulates professional engineering in Ontario to serve and protect the public.

10. The association retained Attila Barbacsy, P.Eng. (Barbacsy), as an independent expert to review the respondents' work. Barbacsy provided a report in January 2017 (the first report), a copy of which is attached as Schedule "I," which concluded, among other things, that the drawing was deficient in several ways, including:
- it failed to adequately account for the design of certain welded connections;
 - it failed to provide adequate detail for the construction of a connection between vertical and inclined members;
 - it failed to provide for a nameplate to indicate the device's maximum capacity;
 - it improperly called for the use of a ratchet strap intended to assist in securing loads; and
 - it failed to indicate and/or apply the appropriate structural engineering standard applicable to the design of a "below the hook" lifting device.
11. Schor provided a response to the first report. Among other things, he claimed that the drawing was only a draft or preliminary drawing, and further claimed that he was not responsible for the design of the welded connections. However, the drawing included details of weld type and size and contained no qualifying or limiting language. Further, as can be seen from the foregoing, Stelfab's documents confirm that it fabricated the device in accordance with the drawing.
12. Barbacsy provided a supplementary report in April 2017, a copy of which is attached as Schedule "J," which concluded, among other things, that the respondents' work fell short of "code requirements, standards of care, and has errors, omissions and deficiencies" and that the design "is less than what would be expected of a reasonable and prudent professional engineer."
13. For the purposes of these proceedings, Schor and Steelcon accept as correct the findings, opinions and conclusions contained in the supplementary report. Schor and Steelcon admit that they failed to meet the minimum acceptable standard for engineering work of this type and that they failed to maintain the standards that a reasonable and prudent practitioner would maintain in the circumstances.
14. By reason of the aforesaid, the parties agree that the respondents, Schor and Steelcon, are guilty of professional misconduct as follows:
- Signing and sealing a drawing for an industrial lifting device that failed to adequately account for the design of certain welded connections, amounting to professional misconduct pursuant to ss.72(2)(a), (b) and (j) of Regulation 941.
 - Signing and sealing a drawing for an industrial lifting device that failed to provide adequate detail for the construction of a connection between vertical and inclined members, amounting to professional misconduct pursuant to ss.72(2)(a), (b), and (j) of Regulation 941.
 - Signing and sealing a drawing for an industrial lifting device that failed to provide for a nameplate to indicate maximum capacity, amounting to professional misconduct pursuant to ss.72(2)(a), (b), and (j) of Regulation 941.
 - Signing and sealing a drawing for an industrial lifting device that improperly called for the use of a ratchet strap intended to assist in securing loads, amounting to professional misconduct pursuant to ss.72(2)(a), (b), and (j) of Regulation 941.
 - Failing to apply the appropriate structural engineering standard to the design of an industrial lifting device, amounting to professional misconduct pursuant to ss.72(2)(a), (b), (d) and (j) of Regulation 941.

DECISION

The panel accepted Schor and Steelcon's admissions of the allegations set out in paragraph 14 of the Agreed Statement of Facts and their guilty pleas. The panel found Schor and Steelcon guilty of professional misconduct as set out in paragraph 14 of the Agreed Statement of Facts.

PENALTY

The parties presented a Joint Submission as to Penalty and Costs, which they amended, for clarity, during the course of the hearing. The Amended Joint Submission as to Penalty and Costs provided as follows:

- a) Pursuant to s. 28(4)(f) of the act, Schor and Steelcon shall be reprimanded, and the fact of the reprimand shall be recorded on the register permanently;
- b) Pursuant to s. 28(4)(b) of the act, Schor's licence shall be suspended for a period of six (6) weeks, commencing on the date of the Discipline Committee's decision;
- c) Pursuant to s. 28(4)(d) and 28(4)(e) of the act, there shall be a condition and restriction on the licence and certificate of the respondents, prohibiting them from practising professional engineering except under the direct supervision of another professional engineer who shall take responsibility for the work; and that other professional engineer shall: (i) sign and affix his or her seal to every final drawing, specification, plan or other document sealed by Schor ("document(s)"); or (ii) sign and affix his or her seal to a letter that shall be attached to, and shall be referred to in, all document(s), which letter shall confirm that the other professional engineer has directly supervised and takes responsibility for the document(s);
- d) Pursuant to sections 28(4)(i) and 28(5) of the act, the finding and order of the Discipline Committee shall be published in summary form in PEO's official publication, with reference to names; and
- e) There shall be no order as to costs.

The parties also confirmed that if the panel were to accept their penalty submission, upon issuance of the panel's decision, Schor would no longer be the responsible P.Eng. for Steelcon's C of A.

The panel determined that the penalty set out in the parties' amended joint submission was appropriate as it fell within a reasonable range of acceptability, taking into account the purposes of penalty. The panel also accepted that the penalty accounted for the aggravating factor—that Schor was disciplined for a similar offence 15 years earlier—and the mitigating factors—the absence of any other issues of concern; Schor's willingness to accept responsibility for his actions; his co-operation with the association in resolving this matter on an uncontested basis; and his having avoided unnecessary expense to the association. Having concluded that the proposed penalty was reasonable and in the public interest, the panel ordered the penalty set out in the Amended Joint Submission as to Penalty and Costs.

At the conclusion of the hearing, Schor waived his right to appeal and the panel administered its reprimand.

Discipline Committee panel: S. Ball, LLB (panel chair), A. Friedman, P.Eng., R. Kumar, P.Eng., J. Amson, P.Eng., and E. Rohacek, P.Eng.

SUMMARY OF DECISION AND REASONS

In the matter of a hearing under the *Professional Engineers Act*, R.S.O. 1990, c. P.28, of a complaint regarding the conduct of JAMES C. HUM, P.ENG., a member of the Association of Professional Engineers of Ontario.

This matter came to a hearing before a panel of the Discipline Committee on January 27, 2020, at the Association of Professional Engineers of Ontario (the association). Counsel for the association was Nick Hambleton. The member (Hum) was self-represented and participated by teleconference from British Columbia. Independent legal advice to the panel was provided by J. David Watson.

AGREED FACTS AND ALLEGATIONS

The original allegations against the member were set out in a Statement of Allegations dated August 1, 2019. Subsequently the parties reached agreement on the facts and entered into an Agreed Statement of Facts, signed by Hum on January 21, 2020. In this, Hum admitted the facts and the allegations of professional misconduct as set out in the Agreed Statement of Facts, as follows:

1. At all material times, Hum was a professional engineer licensed pursuant to the *Professional Engineers Act* (the act). Hum was continually licensed by the association since February 9, 1996.
2. Hum was the sole owner and sole officer of an engineering firm, KNH Engineering, Inc., based in British Columbia. Neither Hum nor KNH have ever held a certificate of authorization (C of A) issued by PEO.
3. Hum was engaged by Backyard Greenhouses to design a greenhouse space to be constructed at Hotel Dieu Grace Healthcare facility in Windsor, ON, a therapeutic and educational centre for children. Subsequently, he signed and sealed drawings and provided correspondence to his client and to BC Greenhouse Builders Ltd., the manufacturer of the component parts of the greenhouse.
4. According to independent expert Albert Schepers, P.Eng., who reviewed the drawings and correspondence on behalf of the association, the initial and subsequent drawings were deficient with respect to:
 - a. Lack of reference to the applicable design codes and standards;
 - b. Providing only partial information on product materials;
 - c. Poorly referencing design loads on drawings;
 - d. Failing to include design loads and support reactions on the original drawings;
 - e. Lack of sufficient detail and design assumptions for the foundation so that another engineer could prepare a site-specific design.
5. In Schepers' opinion, Hum failed to comply with codes, standards and industry norms by failing to recognize that the structure could not be designed to the National Farm Building Code of Canada and by failing to employ appropriate climate data for the intended location of the structure.
6. In response to repeated questions, Hum advised the manufacturer of the greenhouse components that he had taken steps to obtain his C of A, including speaking to PEO and sending a cheque. In fact, he had not done so.
7. Hum was the subject of professional disciplinary findings in two other jurisdictions (British Columbia and Saskatchewan), leading to the revocation or suspension of his licence to practise engineering in those jurisdictions.
8. Based on the agreed facts, Hum is guilty of professional misconduct as follows:
 - a. Signing and sealing structural drawings that failed to meet the standard of a reasonable and prudent practitioner, amounting to professional misconduct as defined in section 72(2)(a) of Regulation 941;

- b. Signing and sealing structural drawings that failed to responsibly provide for compliance with applicable standards and codes, amounting to professional misconduct as defined in section 72(2)(d) of Regulation 941;
- c. Offering and providing engineering services without a C of A, amounting to professional misconduct as defined in section 72(2)(g) of Regulation 941;
- d. Providing engineering services in a dishonourable or unprofessional manner, amounting to professional misconduct as defined in section 72(2)(j) of Regulation 941.

PLEA BY MEMBER

Hum admitted the allegations contained in the Agreed Statement of Facts. The panel conducted a plea inquiry, and was satisfied that the admissions were voluntary, informed and unequivocal.

DECISION AND REASONS

The panel accepted that the agreed facts supported findings of professional misconduct as set out in the Agreed Statement of Facts. Hum's conduct was both unprofessional, in regard to providing deficient drawings and engineering services without a C of A; and dishonourable, by falsely maintaining that he had taken steps to obtain his C of A when he had not done so.

PENALTY DECISION AND REASONS

The penalty was based on a Joint Submission on Penalty signed by the member on January 21, 2020, and by the association on January 22, 2020. Counsel for the association submitted that the proposed penalty appropriately served the principles of sentencing, including the protection of the public, maintenance of the public's confidence in the profession and general deterrence. He noted that, given that it was proposed that the member's licence would be revoked, the principles of individual deterrence and rehabilitation were not applicable.

The panel accepted that the proposed penalty was reasonable and in the public interest. As provided in the Joint Submission, the panel accordingly ordered:

1. That the member's licence be revoked pursuant to s. 28(4)(a) of the *Professional Engineers Act*;
2. That the findings and order of the panel be published in summary form with reference to names pursuant to s. 28(4)(i) and 28(5) of the *Professional Engineers Act*; and
3. That there shall be no order with respect to costs.

The panel noted that relevant factors included the significant and repeated deficiencies in the member's drawings; the potential risk to users of the structure had the drawings been relied upon, the member's disciplinary history in other jurisdictions and his dishonesty regarding his C of A. The panel found the member's co-operation with the association's investigation and his acceptance of responsibility to be mitigating factors, reflected in the absence of a costs award and reprimand.

The panel accepted that the penalty serves to protect the public by preventing the member from offering engineering services in Ontario and provides general deterrence to members of the profession via publication of the finding and order.

Robert Willson, P.Eng., chair of the Discipline panel, signed the Decision and Reasons on June 2, 2020, on behalf of the other panel members: James Amson, P.Eng., Ishwar Bhatia, P.Eng., Eric Bruce, JD, and Michael Wesa, P.Eng.

NOTICE OF LICENCE SUSPENSION, YONG YUE

Yong Yue's licence was suspended for one month, effective April 11, 2020, until May 10, 2020, inclusive. The deputy registrar had delivered a Notice of Proposal to Suspend dated March 11, 2020, by email and mail, pursuant to subsection 19(1) of the *Professional Engineers Act*. The Notice of Proposal stated that Mr. Yue's past conduct afforded grounds for the belief that he would not engage in the practice of professional engineering in accordance with the law and with honesty and integrity.

The past conduct referred to was the fraudulent application of another engineer's seal to one or more drawings prepared by Mr. Yue and submitted to the City of Mississauga. In addition, Mr. Yue engaged in the practice of professional engineering and provided professional engineering services to the public while not the holder of a licence or certificate of authorization. By email, Mr. Yue advised that he accepted the suspension. Since Mr. Yue accepted the suspension and did not request a hearing within 30 days after the Notice of Proposal was served upon him, the deputy registrar carried out the proposal and suspended his licence.

NOTICE OF LICENCE SUSPENSION, SIU H.E. LEUNG

On June 11, 2020, Siu H.E. Leung's professional engineering licence was suspended pursuant to an April 11, 2019, order of the Discipline Committee. The order was issued following a finding of professional misconduct against Leung at a discipline hearing held on that date. Leung's licence was suspended because he failed to write and pass PEO's professional practice examination within the 14-month timeframe prescribed by the Discipline Committee.

COMPLAINTS COMMITTEE: VOLUNTARY UNDERTAKING UNDER SUBSECTION 24(2)(C) OF THE PROFESSIONAL ENGINEERS ACT

In the matter of a complaint regarding the actions and conduct of John H. Vincent, P.Eng., a member of the Association of Professional Engineers of Ontario (Vincent), and 509228 Ontario Limited, O/A J.H. Vincent Services (JHVS), a holder of a certificate of authorization (C of A).

BACKGROUND

1. The complaint relates to three Lot or Block Grading Plan Certificates signed and sealed by Vincent and issued by JHVS. The certificates were in connection with the construction of a single-family dwelling located in London, Ontario (the property). Certificate 2 certified that the proposed building "will be compatible with the proposed lot grading, which is in general conformity for drainage and relative elevations of the adjacent properties." Certificate 3 certified that the "building construction and the grading is in general conformity with the accepted Grading Plan and the "Certified Lot Grading Plan" [Certificate 1] previously submitted."
2. A concrete block retaining wall was constructed along the east and south property lines of the property during its development. This wall was not approved by the city. The certificates made no mention of this concrete block wall. Further, the actual lot grading of the property did not conform to the grading plan referred to in the certificates.
3. The grading issue was discovered when the adjacent owner complained to the city about wet muddy conditions in his backyard.
4. Vincent reported that he had suffered serious health problems. Vincent had not actively engaged in engineering for some time and planned to retire and not undertake any further engineering work. According to PEO records, JHVS' C of A was closed (cancelled December 20, 2016); however, Vincent's licence to practise remained active, with an expiry date of September 30, 2019.

THE COMPLAINT

5. The complaint raised issues concerning Vincent's approval of a grading plan that did not match actual grading conditions on the property as built and included the fact that Vincent failed

to note the existence of, and therefore failed to account for, the impact of the concrete retaining wall.

6. The Complaints Committee received candid and contrite responses from Vincent. Vincent stated that, had he been "aware that blocks were being installed he would have amended the original grading plan and submitted it to the city..." Vincent acknowledged that he made an error in signing-off on the Certificate 3. He relied on the measurements taken by the surveyors instead of personally attending at the building site.

THE CONSIDERATION OF THE COMPLAINTS COMMITTEE

7. The committee considered the complaint on February 6, March 20 and May 15, 2019.
8. The committee was very concerned about the actions of the respondents and the impact on affected property owners.
9. The committee considered the responses received from the respondents, and carefully considered the issues raised in this matter. The committee considered whether a referral to the Discipline Committee was warranted in all the circumstances, and whether it was in the interest of the public and the profession to proceed with the matter. The committee decided that if its concerns were addressed through a voluntary undertaking on the part of the respondents, as well as publication of a summary of this matter, that the public interest issues raised by the complaint would be addressed.

VOLUNTARY UNDERTAKING

10. Vincent agreed as follows:
 - a) He would tender resignations of both his licence and the C of A and commit not to reapply for licensure at any time in the future;
 - b) He would surrender his licence certificate, seal and C of A certificate to the deputy registrar, regulatory compliance within two weeks of the resignation; and
 - c) A summary of this matter, including the Voluntary Undertaking, would be published, with reference to names.
11. Vincent did resign and tendered his certificates, as agreed above.
12. The Voluntary Undertaking described above was accepted by the committee as a dispositive measure, and pursuant to its powers under section 24(2)(c) of the act, the committee decided that this matter would not be referred to the Discipline Committee.

PEO PUBLICATIONS AND RESOURCES

Professional Engineers Ontario has a number of resources, including practice bulletins, brochures, learning modules and fact sheets, available for free on its website at peo.on.ca/knowledge-centre. The following regulatory documents and practice guidelines are available in PDF form on PEO's website.

REGULATORY DOCUMENTS

- The *Professional Engineers Act*, R.S.O. 1990, Chapter P.28
- Ontario Regulation 260/08
- Ontario Regulation 941/90
- By-Law No. 1

PRACTICE GUIDELINES

General—Engineer

- Assuming Responsibility and Supervising Engineering Work Guideline (2018)
- Conducting a Practice Review (2014)
- Guideline on Human Rights in Professional Practice (2009)
- Preparing As-Built and Record Documents Guideline (2020)
- Professional Engineering Practice (2017)
- Professional Engineers Reviewing Work Prepared by Another Professional Engineer (2011)

Use of seal

- Use of Professional Engineer's Seal (2008)

Legal/Discipline

- Guideline on Forensic Engineering Investigations (2016)
- Making a Complaint: A Public Information Guide (2011)
- The Professional Engineer as an Expert Witness (2011)

Communications

- Professional Engineers Providing Communication Services (1993)

Construction/Building

- Design Evaluation & Field Review of Demountable Event & Related Structures Guideline (2020)
- Professional Engineers Providing Commissioning Work in Buildings (1992)
- Professional Engineers Providing General Review of Construction as Required by the Ontario Building Code (Rev. 2008)
- Professional Engineers Providing Land Development/Redevelopment Engineering Services (1994)
- Professional Engineers Providing Mechanical and Electrical Engineering Services In Buildings (1997)
- Professional Engineers Providing Professional Services in Building Projects using Manufacturer-Designed Systems and Components (1999)
- Professional Engineers Providing Services for Demolition of Buildings and Other Structures (2011)
- Professional Engineers—Temporary Works (1993)
- Structural Condition Assessments of Existing Buildings and Designated Structures (2016)
- Structural Engineering Design Services for Buildings Guideline (2016)

Transport/Roads/Municipal

- Professional Engineers Providing Services for Municipalities (Rev. 1998)
- Professional Engineers Providing Services in Transportation and Traffic Engineering (1994)
- Professional Engineers Providing Services with Respect to Road, Bridges, and Associated Facilities (1995)

Software/Computers

- Developing Software for Safety Critical Engineering Applications (2013)
- Professional Engineers Using Software-Based Engineering Tools (2011)

Mechanical/Electrical/Industrial

- Professional Engineers Providing Reports for Pre-Start Health and Safety Reviews (2001)

Geotechnical/Environmental

- Engineering Evaluation Reports For Drinking Water Systems (2014)
- Professional Engineers Providing Acoustical Engineering Services in Land-Use Planning (Rev. 1998)
- Professional Engineers Providing Geotechnical Engineering Services (1993)
- Professional Engineers Providing Reports on Mineral Properties (2002)
- Environmental Site Assessment, Remediation and Management Guideline (2020)
- Services of the Engineer Acting Under the Drainage Act (1998)
- Solid Waste Management (2017)

National Guidelines

- Principles of Climate Change Adaptation for Engineers
- Guideline on Sustainable Development and Environmental Stewardship for Professional Engineers (2016)



10

LEADING WOMEN ENGINEERS IN CANADA'S AEROSPACE INDUSTRY

BY MARIKA BIGONGIARI & ADAM SIDSWORTH

“When you approached me about women in aerospace engineering, I was thinking, ‘Really? Are we still talking about this?’” That was the reaction from Major Marie-Michele Siu, CD, P.Eng., an aerospace engineering officer with the Canadian Armed Forces (CAF), where, Siu asserts, gender has never been a defining aspect of her accomplishments. Siu cites as her hero Elsie MacGill, P.Eng., a woman of many firsts, including being the first female aircraft designer in the world. MacGill was a trailblazer, and the female aerospace engineers who follow in her footsteps are blazing trails of their own. The number of women choosing to study and enter aerospace engineering is slowly growing.

“In my graduating class, maybe 10 per cent were female,” Brigette Van Aert, P.Eng., a software engineer who works in aerial delivery for MMIST, notes. “In all the companies I worked for, I’m usually the only female in the room for most meetings. Maybe there will be one more.” But women are finding success and leadership in this specialized field, and to celebrate their achievements—and challenges—*Engineering Dimensions* is profiling 10 established and up-and-coming female engineering leaders with fascinating and fulfilling careers in Canada’s aerospace industry.

Alis Ekmekci, PhD, P.Eng., associate professor, University of Toronto Institute for Aerospace Studies (UTIAS)

Alis Ekmekci has loved math and science for as long as she can remember. With the support of parents who encouraged her to pursue her passion, and despite being among only a handful of women in a program of hundreds, Ekmekci enrolled in the mechanical engineering program at Istanbul Technical University in Turkey, where she earned her undergraduate degree. She went on to earn master's and doctorate degrees in mechanical engineering from Lehigh University in Pennsylvania, and after doing her postdoctoral work at Purdue University in Indiana, in 2008, she joined the engineering faculty at the University of Toronto (U of T).



Ekmekci founded and leads the experimental fluids research laboratory at UTIAS. Here, with her students, she conducts aerodynamic and aero-acoustic investigations on a multitude of exciting engineering problems, including investigations of techniques to mitigate the flow-induced noise problem in engineering applications, such as aircraft landing gear, aircraft high-lift devices, cavities and synthetic jet actuators; the development of techniques to control flow-induced structural vibrations; explorations in automobile aerodynamics; and research in wind-induced tonal noise generation in architectural panels. In addition to conducting cutting-edge research, Ekmekci also teaches undergraduate and graduate-level fluid dynamics courses, in which she provides engineering students with an understanding of the theoretical and mathematical background for engineering fluid mechanics, something she enjoys immensely. "Training and coaching them on their journey to becoming engineers is the greatest satisfaction of my work," she says.

Although finding funding sources to support research can be challenging, Ekmekci is unfazed. "The most satisfying part of doing research work is that it requires a detective-like approach," she explains. "I love encountering the unexpected while solving scientific mysteries in industrially relevant projects." Among those, Ekmekci has some favourites, including the environmental impact of air travel in terms of noise and air pollution. "Aviation-governing authorities around the globe have been acting on this issue by imposing a series of increasingly stringent noise and gas emission limits on aircraft," Ekmekci explains. "Consequently, airlines are inclined towards purchasing quieter and greener aircraft, and this creates massive competition among aircraft manufacturers." She's been working with Bombardier to develop strategies to reduce noise emissions from aircraft landing gear, slats and various cavities located on the airframe. "These components are the most significant contributors to the overall airframe noise," she says. "I work to contribute to the development of quieter aircraft by exploring the noise-generation mechanisms from these airframe components and by developing noise abatement designs and technologies."

Ekmekci has had the opportunity to collaborate with many commercial partners to solve real-world problems. "As an engineer, I am so excited to see that my projects have practical and social implications in the engineering context. For example, the research work where we explore technologies and designs that can reduce aviation-generated noise and harmful gas emissions would provide the aircraft companies participating in this research with a competitive edge while making a positive contribution to the health and sustainability of the environment," she observes. Ekmekci has been exploring the use of synthetic jet actuators, which, when employed on the critical surfaces of aircraft, present a promising technology to improve the aerodynamic efficiency of airplanes. This improvement in efficiency results in a reduction in fuel burn and thereby lowers harmful gas emissions. However, a major issue holding the technology back is that the actuator itself is loud during operation, sometimes to the point of requiring hearing protection. "We have been exploring methods of reducing the noise self-generated by synthetic jet actuators while enhancing their flow control performance, with the ultimate aim of developing quieter and greener aviation technologies," she explains.

Although Ekmekci is encouraged by seeing more women interested in aerospace engineering compared to when she first started studying 20 years ago, she's eager to see more: "Canada is one of the leading nations in aerospace engineering. I see a bright future in this field," she says. "It is one of the most challenging but intellectually rewarding in engineering."



Holly Johnson, P.Eng., director of business operations, MDA

Growing up, Holly Johnson was always interested in space. As a child, she remembers spending time at the cottage, fascinated as she gazed up at a star-filled northern sky unfettered by light pollution, and her great uncle pointing out satellites flying by overhead. She also enjoyed taking things apart and putting them back together, keen to figure out how things worked. It's not surprising that Johnson's path led her to pursue a career in aerospace engineering and ultimately to her dream job working on the Canadarm program.

Johnson grew up in Brampton, ON, home to Canada's largest space company, MDA, hearing the stories about its world-renowned creation and Canada's claim to fame in space, the Canadarm. In the final years of earning her mechanical engineering degree at U of T, Johnson landed a one-and-a-half-year co-op with MDA on the Canadarm program, and the rest is history.

MDA develops and delivers advanced surveillance and intelligence solutions, defence and maritime systems, radar geospatial imagery, space robotics, satellite antennas and communication subsystems. When Johnson graduated, MDA took her on as a systems engineer, where she worked on a variety of projects in space and medical robotics. Johnson continued to work on Canadarm1 until it was retired with the space shuttle program in 2011. In fact, Johnson enjoys the unique distinction of having worked on all three Canadarms. She conducted engineering analyses on Canadarm2,

which is currently in operation at the International Space Station (ISS) orbiting Earth, looking at how the shuttle-based Canadarm1 interacted with the station-based Canadarm2. And although she's moved on to management as director of business operations, today, Johnson is involved not only in negotiations to get Canadarm3 off the ground but worked in 2014 as an engineer on the concept studies of how it would look. Canadarm3 is going to support the NASA-led Lunar Gateway mission, the next ISS, which will orbit the moon 400,000 kilometres from Earth. "The way international missions work is each country that wants to participate contributes a certain element of technology. Canada, which is well known for its robotics, is going to contribute Canadarm3," Johnson says. "It's very exciting to have worked on all three as an engineer."

Johnson is passionate about her aerospace engineering roots and Canada's place in space. She loves to tell stories about aerospace engineers to help people understand their various missions and accomplishments and to show them what's possible. And she points out the benefits that fall back to Earth in the form of jobs and technology in other areas, such as the medical field. "It always fascinated me that we could develop technologies to send spacecraft and humans to space that push the exploration frontier of where humans can go, but also improve life here by taking that technology and applying it for purposes back on Earth," Johnson says. Most of all, she is excited by all the firsts. Whether it's going to the moon or Mars, it's about breaking boundaries and working at the leading edge of an industry that's pushing the limits of what can be done from a technological and operational perspective. "We have a strong heritage. Canada was the third country into space—not many people know that—and we have an internationally renowned background in high technology that allows us to explore and partner with international companies and countries around the world for space missions," she says.

Erika Kangas, P.Eng., aerospace engineer, Airbus

When Erika Kangas was a young child, her grandfather worked on Air Canada's Dash-8 fleet at the Sudbury, ON, airport. "We were able to fly employee status, so we got to travel quite a bit," Kangas explains. "I fell in love with airplanes and flying at a very young age. I told my mom when I was four that I was going to be involved with airplanes somehow when I grew up." Kangas, who grew up in small communities—initially in Tumbler Ridge, a small mining community in northern British Columbia; and then in Sudbury—mapped out her high-school education so that she could study engineering, choosing the aerospace engineering program at Toronto, ON's Ryerson University. Moving to a big city was a change, but Kangas' ability to make friends and network not only helped her earn her engineering degree but sparked her 11-year globe-trekking flight test engineering (FTE) career.

Kangas currently works as an aerospace engineer at Airbus in Mirabel, QC, where she is supporting the development and certification of the flight manual for the A220 passenger jet. "It's the principal manual for safe operation of the aircraft," Kangas explains. "I'm also supporting flight test integration activities for upcoming A220 test programs, including the definition of required test activities, scoping of instrumentation and preliminary planning."



When Kangas was still at Ryerson, she completed three co-op placements, including two at Bombardier, where she put her networking skills to work. "Before I graduated, I didn't know what opportunities there were," Kangas says. "I didn't know that flight test engineers existed. I ended up meeting people in the flight test group, and I said, 'That's what I want to do!'" Once hired, Kangas enrolled in Bombardier's graduate development program and eventually became an FTE.

"Flight testing is done for any new aircraft under development or when an already-certified aircraft is undergoing modifications. Testing is conducted both on the ground and in the air in order to gather data and perform qualitative evaluations of the aircraft's performance," Kangas explains. "That data is later analyzed by engineering specialists, who make sure the aircraft meets its design criteria. We're

making sure that what we see matches what is on paper and complies with all the regulations. And then if we observe any anomalies or any significant findings, specialists have to come up with a solution."

Kangas spent over seven years at Bombardier in an FTE capacity before working at Gulfstream Aerospace in Savannah, Georgia. There, Kangas met her partner, Darren, also an FTE, and together they travelled across the northern hemisphere before settling in Darren's native Australia, where Kangas worked for almost two years in an FTE capacity at Nova Systems in Newcastle, New South Wales. The number of aircraft Kangas worked on as an FTE is extensive but includes:

- At Bombardier, the Q Series, including the Q100, Q200, Q300 and Q400, which evolved from the Dash-8 her grandfather worked on;
- The Global 5000 and 6000, and the Challenger 605, also at Bombardier; and
- The G500, G600, G650 and G550 at Gulfstream Aerospace.

Kangas was on the first biofuel flight in Canada, and Bombardier also sent her to the Philippines, where she conducted increased runway slope testing for its Q400; and Australia and New Zealand, where Kangas conducted customer flight testing on the Q300 for QantasLink and Air New Zealand.

After a second trip—this time around Australia—Kangas accepted her current position at Airbus, in part because she had worked previously in the same part of Quebec for Bombardier. Kangas is proud that her grandfather had the opportunity to attend her university graduation and the ceremony where she was presented with the Northern Lights Rising Star Award in 2012. "Although he was never able to visit my workplace, he was always very excited to hear what I was working on," she says.

Natasa Mistic, P.Eng., test engineer,
Honeywell Aerospace



Natasa Mistic, who received her undergraduate degree in electrical engineering from the University of Belgrade in Serbia, got her start as an electrical engineer in the automotive industry and was always interested in industrial automation. After working at the end of the line on automated product inspection testing, she transitioned to testing in aerospace and is now a test engineer at Honeywell Aerospace's test engineering department in Toronto, ON.

Honeywell products and services are found on commercial, defence and space aircrafts around the globe, and the company's portfolio includes world-class engines, cockpits, cabin design, wireless connectivity and enterprise performance management services. Mistic specializes in designing hardware and software for automated test equipment and is responsible for the integration of test equipment used for environmental qualification and final acceptance of electrical power and/or environment control units in aircraft, as well as production support. "The most interesting part is when all the parts arrive, because once they have been checked to verify conformity, integration starts," Mistic says. "Machine communication is interesting, decoding the languages and protocols that each machine uses to talk to the control PC and creating a unified system is a big part of my work." The most challenging phase is at the beginning, with the definition of the

requirements: This is when the team must define a comprehensive set of requirements to encompass all possible failure modes and functional variations and simulate real-life challenges that aircraft parts will endure during flight, as well as account for reliability, as one test set must perform consistently for years to come.

Mistic recently completed an integration of the test equipment on the production floor, which included an AC generator and drive coupled with a simulation, control and measurement station—all built new, and with great enthusiasm. "These projects, built from the ground up, provide the greatest opportunity to learn," Mistic explains. "We had an intermittent noise on the signal line, which affected the results once every five to six days—unpredictable but present—and that was unacceptable. It's about accountability."

Problems like these require thinking analytically, perseverance and a willingness to iterate through as many proposed solutions as necessary until successful completion—and in this case, following the signal and interference to its source. "Any design pitfall or maintenance shortcut can risk hundreds of lives and have irreversible social consequences," Mistic points out. "The test engineering department, which is the last gate before the unit is shipped to the customer, has a huge responsibility to confirm that the design has no flaws and that every manufactured unit is built to the design." Mistic likes to analyze, to peel the layers until the essence of what is being examined is revealed, which is useful during fault finding and root-cause analysis. "There are usually many contributing factors but only one trigger that creates or solves the problem," Mistic notes.

Due to the global pandemic caused by COVID-19, this year has been like no other. Challenges are being faced in every industry, and aerospace has been hit particularly hard. Yet Mistic is optimistic about its recovery. "I don't think society is ready to relinquish the opportunity to fly, to switch continents in one day, to visit family and friends back home or to enjoy air travel to new and exciting destinations," Mistic says. "Aerospace engineers were able to lift massive A350 or B777X off the ground and, on a microscopic scale, operate an aircraft with clean cabin air without fear for one's health...As with any problem, focus, perseverance, the courage to not accept partial solutions and accountability will make the future."

Natalie Panek, DSc, P.Eng., senior engineer, mission systems, MDA

Since she was a child, Natalie Panek wanted to be an astronaut. She researched the different types of education and careers other astronauts pursued and learned many were engineers. By the time she was ready to start university, Panek settled on mechanical engineering at the University of Calgary, where she helped build and drive a solar-powered car from Austin, TX, to Calgary, AB, to take part in the North American Solar Challenge. She launched into aerospace from there, earning a master's degree in aerospace engineering at U of T. During her graduate studies, Panek participated in a NASA internship at NASA's Goddard Space Flight Center, followed by the International Space University's space studies program held at NASA Ames immediately after graduation—"All with the dream of one day travelling to space," Panek says.



Everything about Panek says adventure. Growing up in Alberta fostered a passion for the outdoors and nature, and her love for exploring has led her to travel around the world, including backpacking in Eastern Greenland. But exploring the land wasn't enough, so she took flying lessons at the Calgary Flying Club and got her pilot's licence. She was subsequently mentored via the Women's Executive Network by Lieutenant-Colonel (retired) Maryse Carmichael, who was the first female commander and pilot for the Canadian Snowbirds.

Today, Panek builds space robots. As a senior engineer, mission systems at MDA in Brampton, ON, Panek specializes in Canadian space robotics and other space exploration programs. She's currently focusing on a project related to on-orbit satellite servicing, manufacturing and assembly that involves using robotic arms to assemble or repair parts of a satellite once it's in space. "Once you understand

what has to happen on the mission—the requirements that drive your design—systems engineering involves managing those requirements, including figuring out how you're going to verify each one," Panek says. "This also includes thinking through the types of analysis or testing needed to prove a design is going to work in space and then managing the communication between all of the subdisciplines to ensure everyone's talking to each other and working as a team, so that when all the subsystems come together it works as a whole."

Panek recently wrapped up working on the chassis and locomotion system for the Rosalind Franklin (ExoMars) rover—her favourite project yet—which she had worked on since 2015. The ExoMars rover is a European Space Agency Mars rover that will launch on its journey to the red planet in 2022. BEMA, which stands for Bogie Electro-Mechanical Assembly, is the six-wheel mobility system for the rover, whose mission is to drill into the surface of Mars to look for signs of life. The rover's ability to move over difficult terrain is critical to its success. "BEMA is the chassis and locomotion system of the rover. That's the frame the rest of the rover is built on, its legs and all its wheels, as well as actuators that will deploy the rover once it gets to Mars, drive it around and steer it on the surface," Panek explains. The project exemplifies what Panek loves best about her work: problem-solving with a team of dynamic people that makes every day different. "At MDA, we're often working on things that haven't been done before," she notes. "They're really challenging, and we're trying to design products and hardware that can work in extreme environments. You have to do a lot of brainstorming and be creative and bounce off of each other's ideas to make that possible, which is super cool."



Brigette Van Aert, P.Eng., software engineer, MMIST

When Brigette Van Aert was 10, her Walkman broke. “Most 10-year-olds would have thrown it away or asked their parents for a new one,” Van Aert reiterates. “I said, ‘I wonder if I can fix this?’ So, I unscrewed it and took it apart, and it was easy—a wire had popped out.” Van Aert traces her interest in engineering to growing up on a southern Ontario dairy farm. “When I grew up, if something broke, we’d take it apart and fix it,” Van Aert says. “I was usually helping my father, but you look at something before you call somebody.” Van Aert’s farming childhood gave her the ability to achieve success in engineering: “It’s hard work, but it also gives you a strong work ethic. How many 10-year-olds get to drive a tractor? You learn so many skills.”

Van Aert is a software engineer at MMIST, an Ottawa, ON-based full-solution provider of precision aerial delivery, including the GPS-guided parachutes for which Van Aert helps develop the algorithms for self-guided drops. “You’ll have a cargo box, and you say, ‘I want this to land over here,’” Van Aert explains, “and we have a system that tells you, ‘As long as you drop it off anywhere in this giant circle, we can get it there.’” A parachute is attached to the box, and a computer controls the steering. “Our systems have a GPS that always knows the position, and you have to know the projected wind before you drop,” Van Aert adds. “We also have a second system that will give you more

accurate wind readings that you can read before you drop to give you a better position.”

Van Aert asserts that the military is the largest customer for precision aerial delivery, although some humanitarian organizations also access the service. And because MMIST is a smaller company of roughly 45 employees, Van Aert occasionally has the opportunity to interact with military clientele. “When we do a field test campaign, software engineers will be sent,” she says. “I will be out there on the ground, watching the parachutes land and helping to gather the chutes and equipment to take back to the hanger for analysis.” For Van Aert, who loves being in the field, it’s a welcomed opportunity, given that at her previous positions at much larger companies, she rarely had the same chance.

Since graduating from software engineering from the University of Ottawa, Van Aert’s career has evolved: She developed computer coding for satellite communications on airplanes at Honeywell and worked in a similar capacity for helicopters at GDMS. But Van Aert says that her career evolved using similar sets of skills: “If you’ve done software for aerospace or the military, there are overlaps in that there is a lot of certification required,” Van Aert says. “People’s lives are dependent on it. Variables have to be tested. There is certification that has to go on for the software, and once you’ve experienced it, it really helps to get your foot in the door and get more jobs.”

Van Aert says that she hopes to continue working hands on in the aerospace engineering industry. Although her degree at the University of Ottawa included a management certificate and she grew up being a manager of sorts—she’s the oldest of seven children—Van Aert loves getting her hands dirty. “I really enjoy the job I’m doing now,” she says. “I like it a lot.”



A group of apprenticing students pictured at l'École nationale d'aérotechnique (l'ÉNA) in Saint-Hubert, QC. L'ÉNA was a partner school with NCADE.



Catharine Marsden, PhD, P.Eng., associate professor, department of mechanical and aerospace engineering, Royal Military College of Canada (RMC)

“I have a backwards career,” Catharine Marsden admits. Until very recently, Marsden was the Natural Sciences and Engineering Research Council of Canada chair in aerospace design engineering (NCADE) at Concordia University in Montreal, QC. She was tasked with overseeing the program, which began in 2015 for an initial five-year period, with three mandates: an undergraduate large group, full-scale aircraft design project; an industry-focused graduate program; and an undergraduate apprenticeship program. “I have a somewhat unique approach to training graduate students,” Marsden explains. “All my grad students work within industry. I look at their graduate studies as being kind of an advanced engineering degree to train them to be specialists in industry rather than an academic career.” But Marsden distinguishes her program from co-op programs typically offered at the undergraduate level: “The program was an apprenticeship program,” Marsden explains. “Industrial partners in my project actually took on apprentices. And they would work two semesters at school, one semester at the company, always with the same company and always progressing in different areas in the business.”

Marsden began her aviation career in the early 1980s, well before she set foot in an engineering classroom. “I was a mechanic,” Marsden says proudly. “I didn’t have a degree. I worked in James Bay, back when they were building all the hydro lines for Hydro Quebec. There was a lot of helicopter work involved. And I worked as a field mechanic.” (Marsden was an aircraft maintenance engineer and was licensed by Transport Canada.) Eventually, after years of practical experience under her belt, Marsden earned an undergraduate degree in mechanical engineering at McGill University in Montreal, QC—while working full time. “I worked as a mechanic as I was getting my degree,” Marsden reiterates. “I paid my way through university.” Marsden then joined Bell Helicopter Textron, working there for a decade before earning her master’s and PhD, again in mechanical engineering at McGill—while raising a family. Upon completion of her PhD, Marsden returned to Bell Helicopter Textron, where she worked in its research and development department. However, Marsden had a calling to work in the university sector because, Marsden says, you feel your PhD isn’t validated unless you’ve worked in a university environment. Fortunately, for Marsden, there was a position available at RMC. “They were looking for faculty who had solid industrial experience, and I fit into the description pretty well.”

Marsden has high praise for RMC, which sees many of its engineering students working in the CAF while studying and then working in engineering positions within the CAF upon graduation. “It’s very practical,” Marsden says. “The class sizes are very small. The classes are in both official languages. The facilities, in terms of labs and hands-on experience, are unbelievable...As an engineering education, you can’t beat it. In terms of dedication, it’s very difficult because [the students] do an enormous amount of work. They’re doing [the equivalent of] two degrees in one, plus military training. They work way into the evening. But they have a job coming out the other end.”

Marsden taught at RMC for six years before accepting the NCADE chair at Concordia, where “the students were fantastic,” she says. “There’s a huge international population. Their schedules are more flexible. They’re dedicated. They will work an unbelievable number of hours if something interests them. They’ll take risks with their careers that a military student may not. They don’t necessarily have jobs coming out the other end, so when they find an apprenticeship or a co-op, they will work so hard.” However, when the NCADE program came to an end, Marsden elected to return to RMC, where she is today.

Sarah Oliveira, P.Eng., staff electrical engineer, Collins Aerospace



Sarah Oliveira describes her path to aerospace engineering as a happy accident. Although she had a penchant for adventure and was an avid outdoor enthusiast—including completing a 100-kilometre hike through Northern Portugal—her aerospace journey wasn't set in stone early on. Before the end of her fourth year of undergraduate studies in the electrical engineering program at U of T, Oliveira applied to a multitude of positions in order to secure a job after graduation. She got a call back for an entry level job at Honeywell Aerospace in Toronto, ON, working on the distribution software on the A380, and her path to aerospace engineering was set.

Oliveira is now at Collins Aerospace (formerly UTC Aerospace) as a staff electrical engineer, with expertise in systems engineering, aerospace engineering and electrical systems. Collins is an international company that specializes in the design, development, support, modeling and simulation of wireless, ad-hoc networking technologies, including tactical applications used by the Royal Canadian Navy and the Canadian Army, as well as providing system engineering services to Bombardier. As project lead for supplier-designed equipment, Oliveira manages suppliers who are subcontracted to design and manufacture parts for Collins. "The best part of my job is learning about

the various parts we supply—power supplies, electronics boards, distribution equipment, etc.—as well as interacting with all the various groups in-house," Oliveira says.

She loves the problem-solving aspect of the work and finds one of the most challenging facets is managing suppliers from all over the world while having many projects on the go. One of her favourite roles has been supporting flight testing: "It can be very intense and high pressure, but when you have a new design and are ironing out the bugs, there's nothing more rewarding than discovering what the issue is," she says. Her most rewarding project to date was supporting the development of the Bombardier Global 7500 business jet—the world's largest and longest-range business jet, which earned an Ontario Professional Engineers Award for Engineering Project or Achievement in 2019. She was involved in the creation of the jet from the start, working at both Collins and Bombardier at different phases of the project. "From when it was just a group of six engineers sequestered in a secret wing of the office up to today, when it's already been in service for over a year—I feel very invested in its performance and honestly feel I know it inside out," Oliveira says.

As an electrical engineer, Oliveira is excited about the move to more electric and fully electric aircrafts. With aviation having such a significant impact on the environment, she's constantly being challenged to look at lighter materials to reduce fuel consumption and improve the recyclability of products. "The motive behind a more electric aircraft is to reduce or eliminate the dependence on fossil fuels," Oliveira says. "I believe the ultimate solution will remain a hybrid option of some sort. It will be interesting to see if some form of the automotive model can translate to aerospace." She's also excited about the many start-ups pursuing supersonic travel. "Not many people are still around who can remember the Concorde, let alone having flown one. It would be another step in making long-haul commercial travel more accessible," she explains. "Aerospace engineering has made the world a little smaller, connecting communities that were formerly isolated from one another. It strives to connect people faster, cheaper and more safely. I love being part of what's next."



Major Marie-Michele Siu, CD, P.Eng., aerospace engineering officer, Canadian Armed Forces

There is one word that sums up how Major Marie-Michele Siu feels about her aerospace engineering career with the CAF: proud. “I just love the rich history and how everything is so organized,” Siu says. “And when I heard about the regular officer training program at RMC, I thought, ‘Hey, this is for me!’ You go to school for five years, they pay for your undergrad, and then they employ you for five years. [You] have no student loans. You have paid vacations. You have five years in your field, and then you have the option of, Do I stay, or do I pick something else? And for me, it was a split-second decision, and I thought, ‘I’m renewing my contract!’”

Siu is proud to follow in the footsteps of her father, also an engineer. “He gave me my iron ring at the [Ritual of the Calling of an Engineer],” Siu says of her father, who is licensed to practise engineering in Quebec. “He has always been there for me to celebrate my accomplishments, answer my questions regarding the engineering profession.” In fact, when Siu was in grade school, she would often compete in science fairs, with her father enthusiastically supporting her. So, when Siu graduated high school and left home at age 17—high school in Quebec goes up to only Grade 11—she didn’t hesitate to go to RMC. And because of the supporting culture of the CAF, Siu was selected—mid-military career—to attend the University of Tennessee, where she simultaneously earned two Master of Science degrees in aerospace engineering and aviation systems. “For each month of schooling, you work two months of obligatory service,” Siu explains. “I was paid full time to be a student. My job for two years was to study. I cannot imagine all those professionals who work full time and then study evenings and weekends. I don’t know how they find the time to get their master’s degrees.” However, Siu, in retrospect, recognizes how overtaxing it was to

complete two master’s degrees at once. But “looking back, I’m really glad I pushed myself,” she says.

Siu’s educational accomplishment may complement the high expectations that come from working in the CAF. When Siu initially enrolled at RMC, she was required to pick a major (electrical engineering) and a trade (aerospace engineering). And when Siu graduated, she was immediately placed within the Royal Canadian Air Force (RCAF), first as an aircraft maintenance officer, then as a flight test instrumentation engineer. Both positions were based out of Cold Lake, AB. Of her positions with the RCAF, Siu said: “I did have a computer and a desk in a cubicle, but I was also working on the second floor of the hanger. You go to work and smell the jet fuel. I got to see different types of aircraft: When I was in a maintenance supervisor role, it was on the CF-18 Hornet. And then when I was doing the flight test instrumentation job, we did not have the luxury of doing just one specific aircraft. I worked on the CH-146 Griffon and the CH-147F Chinook. And also, the CH-124 Sea King, which has been retired. And the CT-114 Tutor. I worked on five aircraft in total.”

Siu continues: “There are drawings, and I’d be sitting at my desk figuring out how we’d position a camera in the cockpit. And I’d say, ‘Let’s go down and see the aircraft.’” Siu loves being in the aircraft and getting her hands dirty. “I talk to technicians who maintain the aircraft and say, ‘Hey, what about this circuit breaker? What do you think?’ The technicians know the actual aircraft, so it’s important to listen to their point of view.”

Kristen Facciol, P.Eng., operations engineer and flight controller, Mission Control Group, Canadian Space Agency (CSA)

Kristen Facciol was captivated at 10 years old when she attended a space camp and conducted a simulated repair of the Hubble Space Telescope. “They introduced me to all the other roles that were involved, such as the crews on the ground,” Facciol says. Yet the experience remained at the back of Facciol’s mind until after she began university. She was accepted to U of T’s engineering science program, which attracted Facciol because “it is generic in its first two years and you’re introduced to a whole bunch of disciplines, and I appreciated the time to figure out what I was really interested in.” Facciol excelled in aerospace engineering classes—something that she attributes to that early passion for space.

Facciol began her career at Brampton, ON’s MDA, but was soon transferred to CSA’s Saint-Hubert, QC, Robotics Mission Control Centre, where she was contracted by MDA to support robotic components on the ISS, including the Canadarm2 and Dextre. “It was a good foundation and training for what I’m doing now because you learn the hardware in a different way,” Facciol observes. “I was providing the engineering support to the team that I am now a part of.”

Facciol was eventually hired on directly by CSA, initially as a payloads engineer, during which time she supported human research experiments on the ISS. The role allowed her to work more directly with ISS astronauts than in her current role as a robotics flight controller, for which Facciol is much more focused on many of the ISS’s robotics. However, Facciol does still occasionally communicate with the astronauts, training them before they fly to the ISS. “And if we’re working on a space walk together, we’ll have brief meetings to talk with them...we do a few more sessions to make sure they are familiar with what they are about to do and are ready to support the operations.” Interestingly, Facciol received some media attention when there was a possibility that she would be a part of the ground crew of the first all-female spacewalk in 2019; Facciol ultimately didn’t participate but did train the two astronauts.

Facciol observes that many people may be surprised that around 98 per cent of the ISS’s operations are operated from Earth, including at the CSA’s Saint-Hubert location. Facciol also observes how integrated CSA’s control centre is with NASA’s



Johnson Space Center (JSC) in Houston, TX. “Our team is completely integrated with theirs,” says Facciol, who trained at the JSC. “Any mission assignment can have a mix of Canadians and Americans supporting it. Our flight control centre is connected to the one in Houston, and we’re able to control the robotics systems in the same way as they do from there.” Facciol continues: “We have a full operations centre with command capability to the ISS and are often supporting different robotics activities from here. I’m really proud of the fact that we’re Canadians operating Canadian robotics from a Canadian facility.”

Indeed, Facciol is proud of her role with the CSA: Her Twitter feed (@kfacciol) is an online champion of Canadian space robotics, often with vivid photos of the equipment she works with. She is confident of the industry’s growth potential—she cites the recent announcement of the Canadarm3 and its placement on the planned Lunar Gateway, an outpost orbiting the moon that will have CSA involvement. “I’m at the pinnacle of my career,” Facciol says. “I really want to be a part of the International Space Station program until the bitter end. It continues to impress me that a system designed so long ago continues to operate as well as it does.” [e](#)

ENGINEERING AWARDS FROM HOME AND ABROAD

By Marika Bigongiari

The Canadian Academy of Engineering (CAE) inducted 50 new fellows and two new international fellows. The CAE is the national institution through which Canada's most distinguished and experienced engineers provide strategic advice on matters of critical importance to Canada. Its fellows are nominated and elected by their peers in recognition of their achievements and service to the engineering profession. This year's fellows include **Baher Abdulhai, PhD, P.Eng.**, professor, department of civil and mineral engineering, director, Toronto Intelligent Transportation Systems Centre and co-director, iCity Centre for Automated and Transformative Transportation Systems at the University of Toronto (U of T); **Hanan Anis, PhD, P.Eng.**, NSERC chair in entrepreneurial engineering design, faculty coordinator in entrepreneurship and innovation, and professor of electrical and computer engineering at the University of Ottawa; **Robert Crawhall, P.Eng.**, executive director, CAE; **Michael Cunningham, PhD, P.Eng.**, Ontario research chair in green chemistry and engineering, professor, chemical engineering, cross appointed to the department of chemistry at Queen's University; **Geoffrey Fernie, PhD, P.Eng.**, professor, Institute of Biomedical Engineering, and senior scientist, Toronto Rehabilitation Institute and University Health Network, also appointed to the department of surgery, Institute of Medical Science, Rehabilitation Science Institute, the graduate department of exercise sciences and the faculty of kinesiology and physical education at U of T; **Jerzy Floryan, PhD, P.Eng.**, professor in the department of mechanical and materials engineering, Western University; **Chantal Guay, P.Eng., ing.**, chief executive officer, Standards Council of Canada; **D. Jean Hutchinson, PhD, P.Eng.**, professor of geological sciences and geological engineering, Queen's University; **Reza Irvani, PhD, P.Eng.**, professor, electrical and computer engineering, U of T; **Charles Q. Jia, PhD, P.Eng.**, professor, chemical engineering and applied chemistry, and principal investigator, Green Technology Laboratory, U of T; **Yong Lian, PhD, LEL**, professor, department of electrical engineering and computer science, Lassonde School of Engineering, York University; **Emily Moore, PhD, P.Eng.**, director, Troost Institute for Leadership Education in Engineering, and associate professor in the Institute for Studies in Transdisciplinary Engineering Education and Practice, U of T; **Lawrence Tse, P.Eng.**, senior vice president, engineering, Inphi Corporation; **Xiaoping Zhang, PhD, P.Eng.**, professor of electrical and computer engineering and director of the Communication and Signal Processing Applications Laboratory at Ryerson University;



Cristina Amon, ScD, P.Eng., alumni distinguished professor of bioengineering and dean emerita of the University of Toronto's faculty of applied science and engineering, has received the 2020 Engineers Canada Gold Medal Award. Photo: U of T Engineering



Micah Stickel, PhD, LEL, a professor in the teaching stream and vice dean, first year for the faculty of engineering at the University of Toronto, was recognized with the university's President's Teaching Award. Photo: U of T Engineering



Mihaela Vlasea, PhD, EIT, a mechanical and mechatronics engineering professor and associate research director at the Multi-Scale Additive Manufacturing Lab at the University of Waterloo, seen here in the lab, has won an award for young engineers from the Society of Manufacturing Engineers. Photo: University of Waterloo Engineering



Carl Haas, PhD, P.Eng., Canada research chair in construction and management of sustainable infrastructure, and professor and chair of the civil and environmental engineering department at the University of Waterloo, has won the European Group for Intelligent Computing in Engineering 2020 award. Photo: University of Waterloo Engineering

Greg Evans, PhD, P.Eng., a University of Toronto professor in the department of chemical engineering and applied chemistry, has been named a fellow of the Canadian Engineering Education Association. Photo: U of T Engineering



Susan McCahan, PhD, P.Eng., a professor of mechanical engineering at the University of Toronto, has been named a fellow of the Canadian Engineering Education Association. Photo: U of T Engineering



Jason Foster, LEL, professor in the faculty of applied science and engineering, and associate chair, engineering design and pedagogy in the division of engineering science at the University of Toronto, has been named a fellow of the Canadian Engineering Education Association. Photo: U of T Engineering



Norman Zhou, PhD, P.Eng., Canada research chair (tier I) in advanced materials joining and processing and professor, mechanical and mechatronics engineering, University of Waterloo; and **Zheng Hong (George) Zhu, PhD, P.Eng.**, Canada research chair (tier I) in space technology, professor, department of mechanical engineering, inaugural academic director, research commons, office of vice president research and innovation, and director, Space Engineering Design Laboratory at York University.

Cristina Amon, ScD, P.Eng., alumni distinguished professor of bioengineering and dean emerita of U of T's faculty of applied science and engineering, has received the 2020 Engineers Canada Gold Medal Award. The award, Engineers Canada's most prestigious honour, recognized Amon for her outstanding engineering achievements and leadership in the Canadian engineering community. As former dean, Amon leaves a legacy that includes diversifying the curriculum and creating opportunities for engineering students to develop leadership, communication, entrepreneurship and business competencies to prepare them to become the leaders of tomorrow. Amon also made measurable strides in increasing diversity and gender equity at U of T, and she is credited with helping establish U of T's engineering program as a world leader in multidisciplinary engineering research and education.

Gordon Stubley, PhD, P.Eng., a professor of mechanical and mechatronics engineering at the University of Waterloo, has been named a fellow of the Canadian Engineering Education Association. Photo: University of Waterloo Engineering



David Strong, P.Eng., professor and NSERC chair in design engineering at Queen's University, has been named a fellow of the Canadian Engineering Education Association. Photo: Queen's University Engineering



Micah Stickel, PhD, LEL, a professor, teaching stream, Edward S. Rogers, Sr., department of electrical and computer engineering and vice dean, first year, for the faculty of engineering at U of T, has been recognized for his educational leadership and achievements in teaching with the President's Teaching Award, U of T's highest honour for teaching. Stickel co-created and co-chaired the Engineering Equity, Diversity and Inclusion Action Group and has spearheaded the implementation of the faculty's broad-based admissions strategy. Stickel has been on the forefront of creating collaborative learning environments and has had a significant

AWARDS

impact on curricular development, including a redesign of the first-year engineering curriculum. He was recently appointed the next acting vice provost, students and vice-provostial advisor on students for U of T.

Mihaela Vlasea, PhD, EIT, mechanical and mechatronics engineering professor and associate research director at the Multi-Scale Additive Manufacturing Lab at the University of Waterloo, has won the 2020 Ronald P. Harrelson Outstanding Young Manufacturing Engineers award from the Society of Manufacturing Engineers (SME). The SME is a non-profit association of professionals, educators and students committed to promoting and supporting the manufacturing industry. Vlasea, whose research is focused on innovative design, process optimization, the adoption of new materials for two kinds of additive manufacturing and industrial 3D printing, was the only Canadian-based engineer to be honoured with one of 15 awards that recognize top achievers in the field from around the globe.

Carl Haas, PhD, P.Eng., Canada research chair in construction and management of sustainable infrastructure, and professor and chair, civil and environmental engineering department, University of Waterloo, has won a top award for a collaborative engineering paper. The paper Haas co-wrote, titled *Automatic Clustering of Proper Working*

Posture, took home the European Group for Intelligent Computing in Engineering (eg-ice) 2020 award for best paper based on improving the safety and productivity of masonry workers. Eg-ice promotes research and applications of advanced informatics in all aspects of engineering.

The Canadian Engineering Education Association has named its newest fellows, with the following PEO members inducted: **Greg Evans, PhD, P.Eng.**, professor, department of chemical engineering and applied chemistry, principal investigator, Evans Research Group, and director of the Institute for Studies in Transdisciplinary Engineering Education and Practice, Southern Ontario Centre for Atmospheric Aerosol Research, and Collaborative Specialization in Engineering Education at U of T; **Susan McCahan, PhD, P.Eng.**, professor, mechanical engineering, vice provost, academic programs and vice provost, innovations in undergraduate education at U of T; **Jason Foster, LEL**, professor, faculty of applied science and engineering, and associate chair, engineering design and pedagogy, in the division of engineering science at U of T; **Gordon Stubbley, PhD, P.Eng.**, professor of mechanical and mechatronics engineering, University of Waterloo, **Brian Frank, PhD, P.Eng.**, professor, electrical and computer engineering, associate dean, teaching and learning, and the Dupont Canada chair in engineering education research and development in the faculty of engineering and applied science at Queen's University; **David Strong, P.Eng.**, professor, mechanical and materials engineering and NSERC chair in design engineering, Queen's University; **Filippo Salustri, PhD, P.Eng.**, associate professor, mechanical and industrial engineering, Ryerson University; and **John R. Donald, PhD, P.Eng.**, associate professor, College of Engineering and Physical Sciences, University of Guelph. [e](#)

ARE YOU AN ENGINEERING INTERN THINKING ABOUT DEVELOPING YOUR LEADERSHIP SKILLS?

YOU MAY BE A CANDIDATE FOR THE G. GORDON M. STERLING ENGINEERING INTERN AWARD

Introduced in 2010, this award:

- was created to promote, encourage and celebrate the professional leadership of engineering graduates registered in PEO's EIT program
- is named for G. Gordon M. Sterling, P.Eng., PEO president (2001–2002), who believed strongly in the value of leadership development among P.Engs as a means to enhance their careers, and contribute to society and the governance of the profession
- provides up to \$3,500 to offset expenses associated with leadership development pursuits

To apply:

- peo.on.ca/about-peo/awards/g-gordon-m-sterling-engineering-intern-award
- deadline: Friday, October 9, 2020, at 4 p.m.

As the 2020 Sterling Award presentation was postponed due to the COVID-19 pandemic, this year's recipient will join the 2021 Sterling Award winner in a dual, in-person award ceremony held in conjunction with next year's PEO annual general meeting. More information, including date and location, will be provided closer to the gala date.

For more information: email sterlingaward@peo.on.ca, call 416-224-1100 or 800-339-3716

Attend Virtually

The following events can be attended via videoconferencing (see individual websites for details).

September 2020

SEPTEMBER 21-22

International Conference on Advanced Aircraft Systems and Applied Aerodynamics
waset.org/advanced-aircraft-systems-and-applied-aerodynamics-conference-in-september-2020-in-toronto



SEPTEMBER 21-22

International Conference on Aerostructures and Aerospace Robotics
waset.org/aerostructures-and-aerospace-robotics-conference-in-september-2020-in-toronto



SEPTEMBER 21-22

International Conference on Women in Science, Engineering and Technology
waset.org/women-in-science-engineering-and-technology-conference-in-september-2020-in-toronto



SEPTEMBER 23-24

International Conference on Advances in Automated and Connected Vehicle Technologies
waset.org/advances-in-automated-and-connected-vehicle-technologies-conference-in-september-2020-in-vancouver



SEPTEMBER 23-24

International Conference on Face Recognition, Analysis and Synthesis
waset.org/face-recognition-analysis-and-synthesis-conference-in-september-2020-in-vancouver

SEPTEMBER 24

Offshore Wind Summit 2020 Virtual
event.asme.org/Offshore-Wind-Virtual

October 2020



OCTOBER 2-4

NASA International Space Apps Hackathon 2020
spaceappstottawa.com

Listen



NASA's Curious Universe

NASA astronauts, scientists and engineers go on a new adventure each week, from the Amazon rainforest to faraway galaxies.
nasa.gov/curiousuniverse

Airplane Geeks Podcast

An exploration of the world of aviation, with discussions on commercial, military and general aviation topics
airplanegeeks.com

Spacepod

A planetary scientist hangs out with NASA experts and asks them about their work.
listentospacepod.com

Read



Rocket Propulsion Elements, by George P. Sutton and Oscar Biblarz, 2016: A comprehensive introduction to rocket propulsion theory and applications, including thermodynamics, aerodynamics, flight performance, propellant chemistry and recent technological advances in the field

Introduction to Aerospace Engineering with a Flight Test Perspective, by Stephen Corda, 2017: An introduction to aerospace engineering from a flight test perspective, covering aerodynamics, propulsion, performance, stability and control and ground and flight test techniques.

Digital Avionics Handbook, by Cary Spitzer, Uma Ferrell and Thomas Ferrell, 2017: A comprehensive view of avionics, including case studies of avionics architectures, examples of modern systems flying on current military and civil aircraft and emerging trends

Watch



Let's Clean Up the Space Junk Orbiting Earth

In this TED talk, aerospace engineer Natalie Panek, P.Eng., challenges viewers to think about the environmental impact of satellites and the problem of space debris.
ted.com/talks/natalie_pane_k_let_s_clean_up_the_space_junk_orbiting_earth

What is Aerospace Engineering? (Aeronautics)

A look at aerospace engineering, specifically the aeronautics concentration, from work on planes, helicopters and fighter jets, to boats and cars—or anything that involves aerodynamics
youtube.com/watch?v=JHf15JbiWhE

GUIDING THE PROFESSION INTO THE FUTURE REQUIRES A FOCUS ON EDUCATION AND ETHICS

By Patrick Quinn, PhD, P.Eng., C.Eng., FEC, Roydon Fraser, PhD, P.Eng., FEC, and Stephen Armstrong, P.Eng., C.Eng.

Engineering—the practical application of science—is everywhere, yet the profession itself is in decline. For the Canadian engineering profession to continue to be recognized as an esteemed profession, it requires a mutually accepted vision for the future. This vision requires a strategy that focuses on licensing, education and professional ethics.

Today, there are specific engineering specialties defined by their knowledge base and education that society deems worthy of requiring licensure to enable demand-side legislation, to protect public safety or to establish accountability. It can be argued that attempting to regulate engineering today, beyond the requirements of the civil process, is counter to the needs of a society, where disruptive circumstances are becoming an integral and acceptable part of progress. There is evidence in Canada and around the world that self-regulation has perceived inherent conflicts of interest that do not benefit the public when it comes to innovation and progress.

Ultimately, the engineering profession needs to have both an accepted vision and plan to guide its educators and members into the future, along with an agreement on its necessity and from where it will emerge. If left unplanned, the engineering profession will grow willy-nilly as it is presently, and more and more of its disciplines will attain acceptance as XYZ engineers in society. The wide scope is that, because of the acceptance in society of the generic terms “engineer” and “engineering,” enforcement by PEO when it comes to protecting these terms is, and will continue to be, holding back the tide with a pitchfork. The extremely valuable P.Eng. brand of the professional engineer can only be maintained through licensing, but the expectation of licensing everyone who graduates from an engineering school was never a realistic expectation for many reasons beyond the industrial exception.

A WIDER SCOPE OF EDUCATION

For engineering, the concept of an undergraduate university education as preparation for fitting into defined employment roles has passed—the scope is just too vast. Universities have adapted, and over the past 20 years,

Canadian universities have implemented new engineering programs that are linked to non-engineering departments, such as architectural engineering and mechatronics. The tendency is to broaden education so that graduates can, in the real world, have a wider base or platform on which they can build and adjust their career directions as technology and workplace demands evolve.

To a large extent, the education of engineers will follow the opportunities of the marketplace and buy-in from universities that will ultimately require guidance from the profession through its regulators and institutions. An engineering degree today offers vast opportunities in innovation; however, many of these disciplines are not considered the practice of professional engineering. The specialties that require licences are already demanding further qualifications, such as specific examinations in prescribed areas or a master’s degree. Engineering education must equip graduates with the skills to be innovators and change agents, which require so-called soft skills such as critical thinking, problem solving and leadership abilities through humanities courses such as philosophy and psychology.

AN EMPHASIS ON ETHICS

In the probable curtailment of regulation by professional licence granters—which will eventually be limited to enforcing the protection of titles—there will be an onus to individually self-regulate, and in such an environment, with the public aspects of engineering so crucial, ethics and social and environmental issues will only be left in the hands of truly professional practitioners. Ethics establishes the definition of professionalism as going the extra mile in service of client and society; it must be taught at university and promoted in the professional workplace, and in today’s world that represents a major challenge. As events in Quebec proved—where the provincial government put the engineering regulatory body into trusteeship after widespread corruption infected the profession—credibility that had been earned over decades was quickly lost. The Quebec engineering regulator is now trying to rebuild trust with an emphasis on ethics.

The continuance of engineering as a recognized profession that is esteemed in society is the true goal. Our acceptance of the breadth of engineering education that covers basic science as a foundation for the continued learning that evolving technology demands, and the cultivation of the so-called softer subjects of the humanities and ethical consciousness, is one sure way to achieve such a goal. **e**

Patrick Quinn, PhD, P.Eng., C.Eng., FEC, has made a leadership contribution to every progressive change issue in engineering regulation for the last 40 years. Roydon Fraser, PhD, P.Eng., FEC, is a professor of mechanical and mechatronics engineering at the University of Waterloo and a nine-time-elected past PEO councillor. Stephen Armstrong, P.Eng., C.Eng., is founder of AMGI Certified Management Consultants and a professor of innovation at the University of Toronto faculty of applied science and engineering.



Concrete Floor Contractors Association

The Best Floors Start With Our Finish!

Alocon · Apollo · Bartell · Bekaert · Belmont · Bravo · Centis · CPD · Duracon
 Diplock · Euclid · Duron Ont · Duron Services · Metro · Northfleet · WR Meadows
 Sika · Slavko · Structural · Somero · Tri-Con · Tri-Con Haid · United Floor

Tel: (905) 582-9825
 E-mail: info@concretefloors.ca

www.concretefloors.ca

SteelBuildingExperts

Using Manufacturer Designed Building Components?

Project Support for Steel Buildings, Cold-formed, Deck, Diaphragm, Composite Cladding, General Review

steelbuildingexperts.ca • 905 617-2729

Accused of Professional Misconduct?



We can help you protect your reputation. James Lane has acted for numerous engineers in defending negligence claims and professional conduct charges.

BERSENAS JACOBSEN CHOUEST THOMSON BLACKBURN
BARRISTERS, SOLICITORS

416-982-3807
www.lexcanada.com
 jlane@lexcanada.com



Terraprobe since 1977
*Consulting Geotechnical & Environmental Engineering
 Construction Materials Inspection & Testing*

subsurface investigations, foundations, tunnels, erosion, slope stability studies, Phase 1 & 2 environmental site assessments, contamination studies, ground water availability, hydrogeology, septic tile bed design, pavements, soil, asphalt, concrete, steel, roofing, shoring design, retaining wall design

Brampton (905) 796-2650 **Barrie** (705) 739-8355 **Sudbury** (705) 670-0460 **Stoney Creek** (905) 643-7560

www.terraprobe.ca



completewaters
Underwater ROV Services

Brantford, Ontario
 CANADA

Underwater ROV (Remotely Operated Vehicle) services providing high definition imaging, efficient retrieval methods and detailed sediment and water sampling. A safe, time saving and cost efficient way to carry out underwater operations.

www.completewaters.com P: 905 818 5272 E: info@completewaters.com

Sound Analysis
 Sound Experience
 Sound Results
 Sound Solutions to Acoustical Challenges



VALCOUSTICS
Canada Ltd.
Consulting Acoustical Engineers
 Architectural and Environmental Acoustics/Vibration

T: 905 764 5223 F: 905 764 6813
www.valcoustics.com solutions@valcoustics.com

K.H.

DAVIS

ENGINEERING CONSULTANTS LTD
 structural | houses | small projects

- Structural Design for Houses
- Site Reviews & Consultations
- Expert Reports for Litigation
- Architectural Design, Permits

416-489-1228 www.khdavis.com

Experts in Measurement, Analysis & Control

 **ACOUSTICS**  **NOISE**  **VIBRATION**



905-826-4546
answers@hgcengineering.com
www.hgcengineering.com

<p>Drafting</p> <ul style="list-style-type: none"> • AcornPipe • Spoolgen • Acad • Solidworks • Inventor 	<p>Estimation</p> <ul style="list-style-type: none"> • Material Take-off • Weld Take-off • Pipe Fab Costing 	<p>Piping Project Management</p> <ul style="list-style-type: none"> • Spool Tracker • Progress Reports • Load Tracker
--	---	---

70000+ Spool drawings produced yearly

Worked for : Piping Fabricators, Module Yards, Vessel Fabricators



Phone: 780.468.0950
 Email: info@aptechts.com
www.aptechts.com

To advertise within the Professional Directory, contact

Charlene Woron
 905-886-6640, ext. 309
cworon@dvtail.com

AD INQUIRIES Your business card here will reach 80,000 professional engineers. Contact: Charlene Woron, Dovetail Communications, 905-886-6640, ext. 309, fax: 905-886-6615, cworon@dvtail.com

Deadline for November/December 2020 is September 30, 2020. Deadline for January/February 2021 is November 20, 2020.

**A rigorous endorsement
for change from within**

James Cooke, P.Eng.,
Walkerton, ON

In the July/August edition of our PEO magazine, *Engineering Dimensions*, I read the Viewpoint article by Patrick Quinn, PhD, P.Eng., C.Eng., FEC, Roydon Fraser, PhD, P.Eng., FEC, and Stephen Armstrong, P.Eng., C.Eng., all three with very high engineering qualifications to speak on the matter of “The need for radical change from within” (July/August 2020, p. 32). I fully endorse their urgent call for change from within. I believe current members suffer a huge disconnect to the current PEO.

I have been a professional engineer for almost five decades and have seen our PEO organization

(formerly APEO, now PEO and OSPE) wither in its real job responsibilities. So many engineers have no clue about PEO, nor do they care. That is why nine out of 10 P.Eng.s do not vote. I tried to take an interest in voting for several years, looking at the potential councillors running and who was running for president. General apathy would be a good word to describe what I saw. Voting is perceived [by members] as a waste of time with no immediate impact on their lives.

It is time for a PEO shakedown, starting at the top, to realize what these three gentlemen in the article named above have detailed. I think most genuine P.Eng.s in the country want their \$20+ million in membership fees per year to fix this rotting problem, starting at the top. I do not believe the problem is at the bottom. Let’s get at it!

CORRECTION NOTICE

In the article “What’s in a complaint?” in the July/August 2020 issue of *Engineering Dimensions*, the graph on page 31 was mislabelled. The columns should be labelled in this order:

1. Complaints examined and decisions rendered by the Complaints Committee
2. Matters referred to discipline
3. Matters not referred with no further action taken
4. Matters not referred but with a letter of advice sent or an interview held with the member
5. Matters not referred to discipline but with a voluntary undertaking, which was signed and accepted

+**AD INDEX**

Manulife manulife.ca/dimensionsCI	p. 2
TD Insurance tdinsurance.com/melochemonnex	p. 11

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 editor@peo.on.ca.

CALL FOR NOMINATIONS

2021 ORDER OF HONOUR



The Order of Honour is an honorary society of Professional Engineers Ontario. Its purpose is to recognize and honour those professional engineers and others who have rendered conspicuous service to the engineering profession in Ontario.

**THE AWARDS COMMITTEE INVITES MEMBERS TO SUBMIT NOMINATIONS BY
OCTOBER 9, 2020, AT 4 P.M.**

Nominators should supply complete details on their nominee. Individual statements from each nominator must accompany the nomination. Members and Officers of the Order who have continued serving and leading the engineering profession can be nominated for an upgrade to a more advanced category.

For nomination forms, guidelines and a complete list of past recipients, visit PEO's website at peo.on.ca/about-peo/awards/order-honour

As the 2020 Order of Honour gala was postponed due to the COVID-19 pandemic, this year's recipients will join the 2021 inductees in a dual, in-person awards ceremony held in conjunction with next year's PEO annual general meeting. More information, including date and location, will be provided closer to the gala date.

Engineers responsible for certificates of authorization: Have you done your PEAK elements?



Show the public, your colleagues and clients you're committed to competence, professionalism and transparency. The PEAK program helps you and your firm publicize your efforts to stay current in your practice and knowledgeable about your ethical obligations.

After you get your licence renewal notice, log into the member portal on PEO's website and start at the PEAK menu tab. Your PEAK completion status and practising status are posted online on PEO's directory of practitioners.

PEAK
REACHING NEW HEIGHTS

Learn more at peoPEAK.ca | peoPEAK@peo.on.ca | 416-224-1100