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the Association
of Professional
Engineers and
Geoscientists of
the Province
of Manitoba

THE KEYSTONE PROFESSIONAL

WINTER 2013

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New President**
Marcia Friesen

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THE KEYSTONE PROFESSIONAL

The official publication of the Association of Professional Engineers and Geoscientists of the Province of Manitoba



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On the cover: New APEGM President Marcia Friesen.

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Re-Framing and Re-Naming

As APEGM President, I have the opportunity to write four columns in the *Keystone Professional* over the next year. This is the first article in that series, in which I hope to inspire different ways – perhaps new ways – of thinking about our identities and roles as professional engineers and professional geoscientists and how we think of our profession within larger society.

The names we give things matters. Sometimes we have called something by the same name for so long that we have also ‘fossilized’ our idea of what it means and what value it has. Changing the name opens the door to painting a new picture of the concept. For example, where in the past the word ‘disabled’ or ‘disability’ was used almost ubiquitously, the words ‘accessibility’ and ‘impairment’ are now consciously used where appropriate, shifting how we may think about the concept of ability. A number of years ago, the federal government changed the name of Unemployment Insurance to Employment Insurance. A friend of mine uses the term ‘solo parent’ – a comment on the context within which he parents- rather than ‘single parent’ – a comment on his legal relationship status. Lately, I hear the word ‘newcomer’ preferred to the word ‘immigrant’. ‘Newcomer’ allows us to break with historical ideas we may hold of the profile of an immigrant and immigration to Canada, and ‘newcomer’ also connotes that the status is temporary; soon, this person will also be a Canadian, no longer set apart.

To me, these shifts are not necessarily done on the whim of political correctness. Rather, they are comments on deeper personal, corporate, or societal shifts in our values, at times challenging the assumptions we hold about the idea. When we re-name things, we may come face-to-face with long-held beliefs

and values that were invisible to us until that point. From there, we also have an opportunity to move to new understandings.

We have all probably read an article, listened to a seminar or course, or had a discussion about what defines a profession. Different sources have anywhere from four to seven key characteristics of a profession, but the common ones include a specialized body of knowledge attained through intensive education and training, an authority through self-regulation, high standards of achievement and conduct enshrined in a Code of Ethics, a commitment to continued learning, and public service as its primary purpose.

If we are honest with ourselves, we likely all have notions of ‘knowledge’, ‘professionalism’, and ‘ethics’ that we have not seriously challenged in quite a while, and that in fact we don’t spend much time scrutinizing at all. Our inner dialogue may say “yeah, yeah, I know what you mean” when we hear about the importance of staying current, about the priority of the public welfare, or about the regulatory mandate of APEGM. Sometimes a change in wording is an opportunity to think about things in a new light.

Thomas Green¹ provides a new way to think about professional knowledge and practice. He focusses on what he calls the formation of conscience, which is simply the reflexive capacity to be our own judge, or ‘reason commenting upon conduct’.

Green asserts that conscience has distinct voices that must all be cultivated:

1. Conscience as craft: one’s technical skill, extended by the ability to judge one’s own performance (for example, feel satisfaction, pride, shame, embarrassment, etc.). A sense of craft underlies our concern with excellence in our work.
2. Conscience as membership within a community, attachment to a community, and acquisition of the norms of the community in an ethic of caring and responsibility. Membership is said to be strong when one’s behaviour conforms to a certain pattern, and when the departures from normative behaviour have the capacity to elicit emotions such as guilt, shame, anxiety, or fear. Norms become most visible and obvious when a member departs from them. Further, conscience as membership asks the question, ‘what is good for us to do’ rather than ‘what is good for me to do’.
3. Conscience as sacrifice, or the necessity of performing actions “that fall beyond the limits of mere duty”. Sacrifice is not defined as self-sacrifice or injustice relative to oneself, but rather as indifference to self, or a disinterest in the self in an act that goes beyond obligation. Such actions are most easily found in the context of friendships and memberships. They are cultivated in the practices of keeping promises,

¹Green, T.F. (1985). The formation of conscience in an age of technology. *American Journal of Education*, 94(1), 1-32. See also, Green, T.F. (1999). *Voices: The educational formation of conscience*. Notre Dame, IN: University of Notre Dame.

speaking honestly, keeping contracts, and preserving confidences.

4. Conscience as memory: addressing the human need for rootedness or fixedness, or an anchoring in the knowledge of one's social inheritance. Rather than commitment – which is a personal choice – the idea of rootedness refers to the ancestry that one cannot choose, and then claiming it as one's own and working upon and from it. The conscience of memory is developed through narrative and storytelling of members.
5. Conscience as imagination: a vision and voice from within the community, carrying a critique-ful tone that speaks to the disconnect between what is and what could be. The voice from within the community has the capacity to draw new metaphors, challenge established ideas, articulate a vision for the future, and motivate the community toward these new understandings and fresh beginnings.

We do not usually use these kinds of words to talk about ourselves or of

the engineering and geoscience professions. Yet perhaps they spark a new perspective or a new insight into our deeply formed notions of the professional engineering and professional geoscience as technical skill, professional membership, service, history, and leadership, respectively. Different words can evoke different images and metaphors that allow us to think in a new way about our personal identity as a professional engineers and professional geoscientists.

Beginning in late 2012, the APEGM Council embarked on an exercise under then-president Dawn Nedohin-Macek, P.Eng., to identify areas of strategic priority for APEGM. These areas would help APEGM focus its efforts in the near and medium term. Through a guided process, three areas clearly emerged:

1. Recruitment and retention of under-represented groups in engineering & geoscience studies and engineering & geoscience practice, including but not limited to Aboriginal students, women, internationally-educated engineers,

and those transitioning to engineering or geoscience from a different career;

2. Government relations, including establishing a proactive presence with various levels of government to highlight the importance of engineering and geoscience to a productive economy, and shaping a role and reputation for the engineering and geoscience professions as easily-understood and reliable advisors on issues in the public sphere; and
3. Public perception, including building an image and reputation of the engineering and geoscience professions as multi-faceted, exciting, and equitable professions.

The APEGM Executive is now working to conceptualize these areas more fully and to define measurable actions that APEGM has the ability to support and initiate.

In my future columns in this magazine, I will explore each of these three areas in more detail, looking for ways to help us think about these ideas in new light. Your feedback is always welcome to *marcia.friesen@umanitoba.ca*. ☎

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The Value of P.ENG., P.GEO. and Other **Member Benefits**

The question comes up over and over again. Each year there are a few non-members (and members) who ask me the question: "So what is the value of a P.ENG. or P.GEO.?"

I recently discussed this topic with Christine Plourde, P.Eng., FEC, President-elect for Engineers Geoscientists New Brunswick. Together, we came up with some reasons why the professional designation is valuable in today's marketplace:

On your business card, the 'P.Eng.' gets noticed. Many times, in many settings (prior to my role as Registrar), when I handed my business card to a non-engineer, they would look at my card and reply "oh, you are an engineer!" The 'P.Eng.' on your business card gets noticed.

Are You Smart?

When I am introduced as a professional engineer, people assume that I am smart, practical and have an interesting career. Not a bad starting place in a conversation. What you say after that is up to you, but generally people accept you as a knowledgeable, ethical person at the start of each introduction because of the 'P.Eng.'

The Association does a good job of sorting-out unqualified or unethical practitioners. We can give a hearty thanks to the dedicated volunteers on the Admissions committees (Academic Review, Experience Review, Registration) and Investigation Committee for these important regulatory functions.

Ask yourself "do I want to invest in a mining company where the geoscientist in charge is NOT a registered P.Geo.?" Do you remember Bre-X? No? You should Google/ Wiki that one. It is a sad story of fraud and million dollar losses because of mining executives who lied about a gold deposit. Canadian investors lost millions. One person lost his life.

For many employers, it means more pay. I realize this is not a general rule, but I can think of times when it did pay off for me and many fellow professional engineers.

Are You In or Out?

It shows that you are part of a profession. You are not part of a trade, guild, society or union. You are part of a self-regulating body of qualified persons with a moral and ethical responsibility to the public by virtue of your specialized knowledge, training, skill and good character. You can opt out of this responsibility if you want, but I choose to opt in!

“You are part of a self-regulating body of qualified persons with a moral and ethical responsibility to the public.”

A local grad once said to me: "I wouldn't bother with the P.Eng. if my employer didn't force it on me". Huh? What? I was shocked. Can you imagine a graduate doctor not wanting to be called 'Doctor' or put 'MD' behind his or her name? What about a chartered accountant not putting 'CA' behind her name? Or a lawyer not putting 'LLB' on his business card or letterhead? I cannot imagine ploughing my way through five years of rigorous education, four years of internship and then saying "I wouldn't bother with the P.Eng. if my employer

didn't force it on me." Attaining a professional designation is a sign of self-respect. Ultimately, upon registration with the Association you show that you believe in yourself and your fellow professionals.

Please join with me in promoting the profession by talking to any of your work colleagues who presently are not registered. I realize that they may have some strong reasons for not registering, but we'd like them to reconsider the value of the 'P.Eng.' and 'P.Geo.' and join us as recognized professionals.

Other Member Benefits

I have asked Volunteer Coordinator Diana Vander Aa to send out a call for volunteers to serve on a 'Member Benefits Committee.' The purpose of this committee is to research and pursue agreements with retail vendors and service providers who will offer a discount or special service to our membership. So far, the list is short; you can get personal insurance and a digitally encrypted seal because of your membership. But what about discounts on building materials, furniture, winter vacations, rental cars, consumer electronics, groceries and other benefits only available to large groups? If you would like to help bring member benefits to the 7,083 engineers and geoscientists in our Association, please respond to Diana's volunteer invitation. Your ideas for an expanded member benefits program are welcomed.

Oh, and one more thing: remember our slogan: **"My life's work, makes life work better."** As always, your feedback is invited and welcomed. If you have any thoughts on anything you read in the *KP*, please email me at gkoropatnick@apegm.mb.ca. ☎

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Can We Be Trusted?

Over the past couple of years, there have been a number of incidents that have, rightly or wrongly, focused attention on the role engineers play in assuring public safety. Safety of the public is, of course, a prime responsibility of our profession. But when things go wrong, finding the cause is neither quick, nor easy. In the eyes of the public, professional due diligence is often perceived as avoiding responsibility. This is the sort of media attention we do not want.

Consider the June 2012 Elliot Lake Algo Centre Mall collapse made international headlines and resulted in extended hearings. Clearly, there were issues relating to the adequacy of the building inspections that preceded the collapse. Rescue attempts were halted/delayed because of “unacceptable risk” for those who would be required to enter an unstable structure. More than a year later there are still more questions than answers.

The July 2013 derailment and fire at Lac Megantic caused multiple deaths and destroyed much of the town centre. Both criminal and technical investigations were launched, but while the effect is obvious, the real causes are unclear. It is easy to question the operational procedures that preceded the incident. Lack of equipment maintenance has been cited as critical. Tanker cars that were not appropriate for the product being shipped have also drawn attention. But again, more questions than answers.

This summer in Nanaimo, a debate about the decommissioning of the two 100 year old Colliery Dams has been raging. Professional engineers have classified these dams as extreme safety hazards. Members of the public suggest that the lakes, which exist because of the dams must be preserved.

About the same time in Montreal, an engineering report on the condition of 589 bridges, tunnels and overpasses listed 24 structures that were in ‘critical’ need of repair. A city official has suggested that the structures are not ‘unsafe.’ Both the City Engineers who undertook the study and

an Engineering professor, who specializes in structures, disagree.

The debate over the proposal to remove the ‘industrial exception’ clause from the *Ontario Professional Engineers Act* shifted the scene from infrastructure to manufacturing facilities. The profession observed that the workplace safety record in Ontario industry would improve if companies were required to employ professional engineers. Industry leaders, on the other hand, suggested it would do little more than increase costs. The ‘exception’ remains a part of the Act.

In most real world situations, the process of decision-making and final approval is less than clear. Technical issues that may put the public at risk are, by law, engineering responsibilities. However, it is seldom, if ever, that final-decisions are left entirely in the hands of engineers. Probably because of the responsibilities imposed by engineering acts, when something goes wrong, engineering input is the first thing to be questioned. It falls to the media to investigate and explain what has happened. Few reporters have technical backgrounds so they seldom view an incident from a technical perspective. Some reporters turn to engineers for explanations. But our explanations will always be evaluated from the reporter’s view, not ours.

For me, this has always been a concern. That concern deepened about ten days ago I received an e-mail from a journalist who was working on “... a potential feature about how we value life – or, more to the point, how much we will spend to save one”. He noted that “... no expense is spared in the emergency room when it comes to saving a life”. But then he, and his National Post Features Editor, asked “... how much engineers value safety during the design process of, say, a bridge. I’m wondering if we could always make things safer but draw the line at a certain point for the sake of cost and efficiency”. He ended his e-mail with the question, “Is cost no object, or do we accept a certain amount of loss of life?” I must admit that my first reaction to the e-mail was defensive. Clearly this reporter did not trust my fellow professionals.

Time commitments, at both ends of this ‘conversation’, delayed direct contact for a week. During our subsequent one-hour phone call, we touched on, among other things, provincial legislation, professional registration, codes of ethics, technical competence, legal responsibilities, codes, standards, performance specifications, ‘real’ project control and limits of knowledge. From my perspective it was like delivering the first lecture in a course during which you outline the topics to be considered and attempt to demonstrate how they are linked. I came away from the ‘conversation’ feeling better, but I was stuck with the reality that I had only been able to deliver an ‘introductory’ lecture.

Upon further reflection, I realized that my initial reaction to this specific e-mail inquiry was unfair. Based on our telephone conversation, I believe that the journalist was truly attempting to gain an understanding of the role engineers play in the creation of infrastructure. He seemed to be trying to understand where engineers fit into the equation, not make a blanket statement assigning blame. If the feature he was working on ever sees the light of day, I will find out if I am correct.

However, from our profession’s perspective, the real issue behind these specific e-mail questions has little to do with my conversation with one journalist. When you consider the typical media coverage of the incidents cited, it is easy to conclude that we do not enjoy the level of trust that is implied by the existence of the Engineering Acts under which we practice our profession. Our Acts define our responsibilities, but many ‘authorities’ can, and do, make decisions that go counter to our recommendations and the public is placed at risk.

Maybe the final caution should be left to the editor of the Nanaimo newspaper in which the Colliery Dams debate was reported. He/she observed that “Public safety is serious business and should have nothing to do with politics.” And remember, “politics” is not restricted to those in elected office. ☺



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Thoughts on Design ... and Us Versus Them

M.G.(Ron) Britton, P.Eng

Back in 1964, about the time that many Faculties of Engineering were beginning to take steps to be known as Faculties of Applied Science, Jacques Ellul suggested "When the technical means do not exist, science does not advance." The wisdom of his delineation of the respective roles of engineers and scientists did not get much attention in that era when the space race was in accelerating mode. In the media coverage of the day, accomplishments were hailed as scientific successes and failures were blamed on engineering. Things haven't changed that much.

In his REFRACTIONS column in ASEE's November 2012 PRISM magazine, Henry Petroski reflected on media coverage of the landing of the curiosity rover on Mars and the discovery of evidence of the existence of the Higgs boson elementary particle at the European Laboratory for Nuclear Research. Both accomplishments are heralded as great advancements in science. However, the CERN Higgs boson team is said to have suggested that the Mars landing "does not qualify

"Knowing 'how' is fundamental to engineering and engineering design. It is different from, not less than, knowing 'that.'"

as a significant scientific achievement and should not be getting so much of the public's attention."

I agree with the first part of the Higgs boson team's statement. The landing of the curiosity rover on Mars, and its successful collection, analysis and transmission of findings does not "...qualify as a significant scientific achievement..." Rover is a **significant engineering design achievement**. As to the issue of "...public's attention," I would suggest this **significant engineering design achievement** should receive more attention, but not as a scientific accomplishment.

Maybe, 48 years later, this particular group of scientists has come to understand what Ellul meant. Maybe they were saying that the landing, and the hardware involved was engineering that

enables science to proceed. But maybe not. This particular group of scientists work in a facility that was designed, built, maintained and upgraded by engineers. But there is nothing to suggest that they realize the significance of that engineering accomplishment either.

The engineers who designed the curiosity rover worked almost entirely on the basis of assumptions. They were well-informed assumptions, but assumptions none the less. After all, no one had ever accomplished a soft landing of a delicate instrument on the surface of Mars and then activated the vehicle to collect scientific data. Until that task was accomplished the scientists were just observers. The project was unique and challenging, but stripped of its glamour, it was functionally very similar to work that is done in engineering design offices on a daily basis.

But this shouldn't become an argument over "turf." Rather, it is a clear separation of the sort of knowledge used by the two groups that are involved in the Mars rover project (and in many other projects for that matter).

Bucciarelli has argued that we can separate knowledge into knowing 'that' (science) and knowing 'how' (engineering). If we accept that Petroski was correct when he observed that "Engineering is the rearrangement of what is." and that Koen's definition of the engineering method "... the strategy for causing the best change in a poorly understood or uncertain situation within available resources." is valid, then it follows that knowing 'how' is fundamental to engineering and engineering design. It is different from, not less than, knowing 'that.' Ellul got it right, and the curiosity rover clearly demonstrates that fact. We, as a profession, should celebrate that fact. ☩



The advertisement features a blue and white background with a stylized globe. The AMEC logo is in the top right corner. The main text reads: "Shaping the Future. A global leader in environmental and infrastructure services." Below this, it states: "AMEC is a leading supplier of consultancy, engineering and project management services to our customers in the world's oil and gas, mining, clean energy, environment and infrastructure markets." At the bottom left, there are social media icons for LinkedIn and Twitter with the text "Follow Us". At the bottom right, the website "amec.com" is listed.

Working Abroad in North and South America

by R. Reis Pagtakhan, LLB

When recruiting foreign engineers and geoscientists to work in Canada, one of the best ways is to use temporary entry provisions found in various free trade agreements. Canada has with other countries. While Canadian businesses use these agreements to expedite the entry of foreign engineers and geoscientists into Canada, these agreements also allow for reciprocal treatment for Canadian professionals.

The recent announcement that negotiations on the Comprehensive Economic Trade Agreement with Europe have concluded may result in Canadian engineers and geoscientists being given the opportunity to work in Europe. While this agreement offers potential opportunities in the future, there are a number of existing free trade agreements that already give engineers and geoscientists the ability to work in a number of countries in North and South America.

The oldest of these agreements is the North American Free Trade Agreement ('NAFTA') entered into by Canada, the U.S. and Mexico in 1993. Previous to this, the Canada-U.S Free Trade agreement allowed engineers and geoscientists to work in the U.S.

The NAFTA allows for Canadian engineers and geoscientists (defined as geologists, geochemists, or geophysicists) with prearranged employment to work in either the U.S or Mexico. In order to qualify, a Canadian engineer must show that he or she is the holder of a bachelor's degree or a provincial license to practice engineering. Canadian geoscientists must show that they have a bachelor's degree.

The qualifications needed to work as an engineer or geoscientist in Chile under the Canada-Chile Free Trade agreement are essentially the same as the qualifications needed under the NAFTA.

If an engineer or geoscientist wants to work in Peru or Columbia, the free trade agreements with these countries require

individuals to meet a slightly different test. In order to qualify under these agreements, the Canadian engineer or geoscientist must demonstrate a theoretical and practical application of a body of specialized knowledge. In addition the Canadian engineer or geoscientist must be eligible to obtain a certification or license to practice engineering and have at least a four-year bachelor's degree. As a result, certain engineers who may have received a license to practice engineering before the degree requirement may have challenges. Unlike the NAFTA and the free-trade agreement with Chile, permanent residents of Canada (as opposed to only Canadian citizens) can also qualify to work in Peru or Columbia.

While free trade agreements open up a number of business opportunities for Canadian engineers and geoscientists, when practicing a profession in a foreign jurisdiction, it is important to look at other considerations beyond immigration laws. For instance, it is essential to take

into account any foreign licensing requirements, income tax implications for the business and the individual going abroad, whether Canadian health coverage could be maintained outside of Canada, professional liability insurance, and a host of other factors. ⊕

This article is prepared for general information purposes only and should not be viewed as legal advice or opinion.

Reis is a Partner with Aikins Law and practices in the area of immigration law. His direct line is 204.957.4640. If you would like to know more about Reis, follow him on Twitter or connect with him on LinkedIn. Reach him at rrp@aikins.com.

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Female Participation in Engineering in Manitoba

by Kathryn Atamanchuk, P.Eng.

Have you ever wondered what APEGM's registration stats look like? Is the participation of women in engineering increasing? The Committee for Increasing the Participation of Women in Engineering (CIPWIE), a committee within APEGM, is tasked with understanding, evaluating, and increasing female participation in the engineering profession within Manitoba. To help understand where Manitoba sits with respect to gender equity, CIPWIE has prepared a report to capture all facets of female engineering involvement in Manitoba, by including data on both APEGM membership as well as enrolment in engineering programs at the University of Manitoba. The information contained herein is an abridged version of the report.

Please refer to www.apegm.mb.ca for a full version of the report.

Based on information from Engineers Canada, in 2010, the national average of female enrolment in accredited engineering programs was 17.7% [1]. Figure 1 contains data provided by the Office of Institutional Analysis at the University of Manitoba that shows the trends in female enrolment in engineering programs at both the undergraduate and graduate levels. The data is based on the Winter 2013 term (January to April) [2]. The percentages shown in Figure 1 for enrolment by program within the Province of Manitoba are generally in line with national trends. The Internationally-

Educated Engineers Qualification (IEEQ) Program is a program within the Faculty of Engineering at the University of Manitoba that aids engineers that have been educated outside of Canada meet the requirements to become registered with APEGM. As can be seen from the data, 20% of IEEQ students enrolled in the Winter 2013 term were female.

In order to increase the participation of women in engineering, focus must not only be placed on encouraging young women to consider post-secondary engineering programs, but also on providing support to women as they leave school and enter the engineering profession. APEGM membership data is collected on a quarterly basis and includes members who are practicing, retired, members-in-training (MITs), or are on deferred dues. The percentage of female members to the total APEGM membership based on the last ten years (2004-2013, using first-quarter data) is depicted in Figure 2 [3]. As can be seen, in the first quarter of 2013, female practicing members make up just under 8% of the total APEGM membership (which is up from approximately 5% in 2004). This is below the national average of 10.5% female professional members as reported by Engineers Canada in 2010 [1]. Of note is that the percentage of female MITs has actually decreased from 20.0% in 2004 to 15.1% in 2013. Further research should be conducted to understand the MIT to practicing member transition, as it appears that the number of MIT members within APEGM does not directly correlate with an increase in practicing membership after a four-year period (the time typically required to obtain a P.Eng. designation).

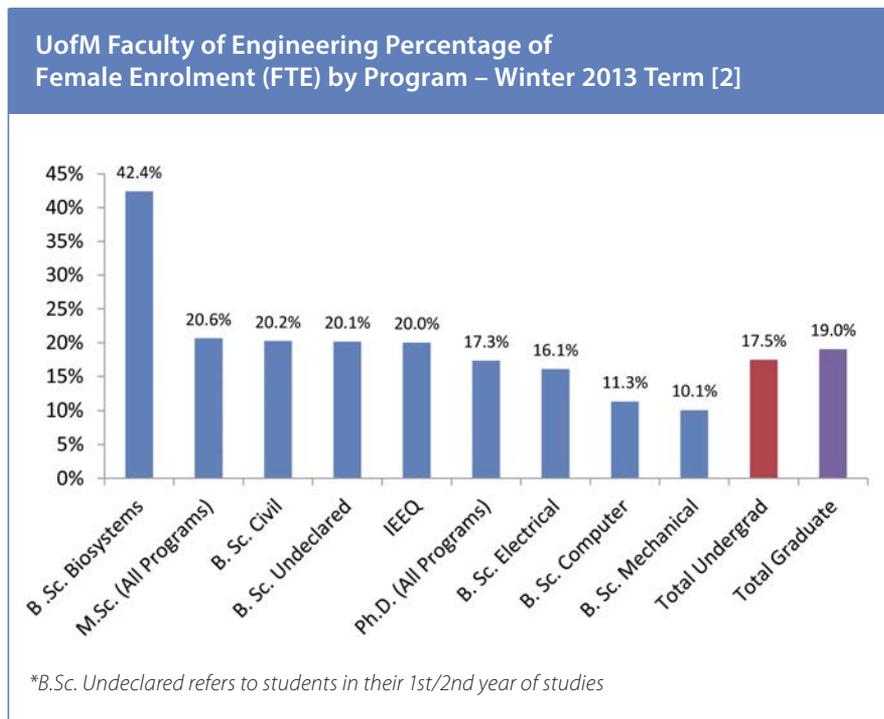


Figure 1

Percentage of Female Members to Total APEGM Membership [3]

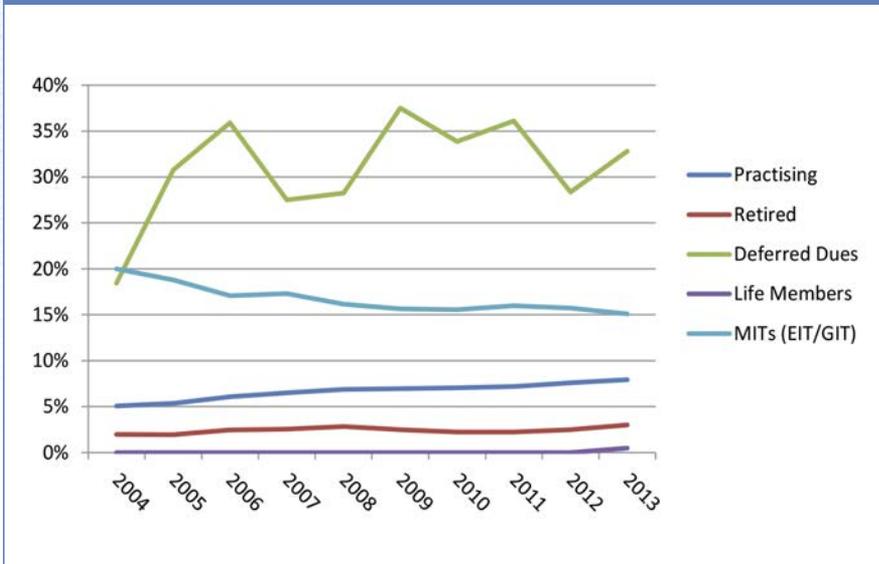


Figure 2

In summary, the current percentage of females practicing engineering in Manitoba is less than 8% [3], which is below the national average of 10.5% [1].

With 17.5% female enrolment in Manitoba undergraduate programs [2], recruitment into engineering education programs remains a key consideration. The CIPWIE

committee is currently investigating opportunities to track cohort data, to determine retention data and progression through education, member-in-training, and professional licensure.

This report was prepared by Kathryn Atamanchuk P. Eng., MBA, PMP, Engineer-in-Residence at the University of Manitoba, on behalf of CIPWIE, APEGM. ⊕

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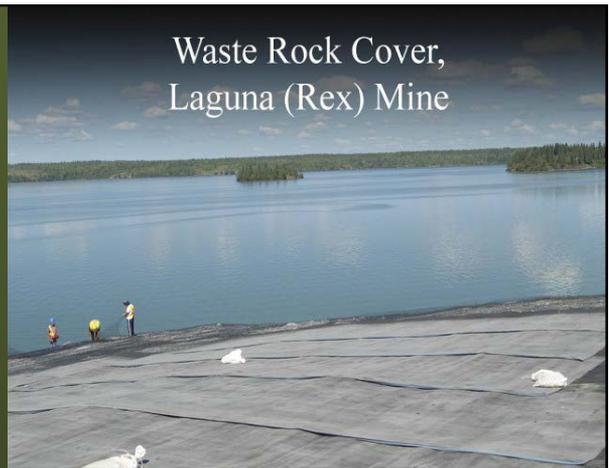




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This year marked the second annual Ingenium APEGM conference. The weeklong series of events kicked off with the APEGM New Members Luncheon and Certificate Presentation at the St Boniface Golf Club. The luncheon is held twice a year to recognize new members and formally present them with their official license certificates.

On Wednesday, the Recognition Wine and Cheese was held in the Broadway Room at the Fort Garry Hotel. The reception was held to honour APEGM Past Presidents along with new APEGM Life Members and members who have been selected to receive the Engineers Canada Fellowship (FEC).

With a day of shopping and lunch planned for the Partners Program, Thursday consisted of the Professional Development Seminars for Professionals, student Members and several distinguished out of town guests. The morning kicked off with a continental breakfast along with greetings from long time Manitoba MLA Steve Ashton. Mr. Ashton highlighted several of his experiences from working with engineers and geoscientists throughout his career.

Much like last year, the seminars were set up with four tracks, each containing four one-hour sessions spaced throughout the day. Covering a variety of themes that impact today's professionals, the presenters did an excellent job educating attendees while answering any questions brought forward.

The "Facing Challenges in our Profession"

track focused on several issues that impact Professionals in their day-to-day life. Opening with the "ABC's of P-E-N-G", APEGM Executive Director Grant Koropatnick provided an overview of the three key APEGM governing documents, including some history and a question and answer session. Following that, "Facing the Challenges of Registration" focused on some of the recent trends faced by Admissions, particularly with regards to foreign trained engineering applicants. After lunch, the third session of "Do you Need a Certificate of Authorization?" answered such questions as "Does my corporation need to be registered?" and "What are my ethical obligations to ensure that my organization is compliant?". The final session in this track was an overview of the Public Interest Review Committee. It reviewed the role of the newly formed committee, along with a discussion on the types of issues that they may face moving forward.

The "Facing Challenges in your Workplace" track provided attendees training and guidance for potential issues faced in their workplace. Then, a seminar entitled "Communicating Across Cultures" took a light heated look at what constitutes culture and the factors that influence it. This was followed by "Security in the Real World: How to Reduce FUD"; a presentation on IT security topics and techniques. The third session was "Diversity: The Good, The Bad, and The Ugly", a review of the Workplace Safety and Health Act along with the

Human Rights Code and the benefits and challenges that diversity can bring to the workplace. The final session in this track entitled "So, You Have to Give a Talk" provided guidance as to how to structure a presentation while being more engaging to your audience.

Track three, "Facing Challenges in the Province", covered several issues facing professionals within Manitoba. It began with a session reviewing the concept of an Electronic Seal and the latest digital signature software. The second session was "When Demand Exceeds Supply", a talk that reviewed an Engineers Canada article that examined the demand for engineers across the country over the next several years from a Manitoba perspective. Following lunch, the third session "Collusion and Corruption in the Construction Industry" reviewed the scandals faced by the construction industry in Quebec and how to avoid similar situations. This track wrapped up with a session entitled "How to Avoid Litigation on Engineering Projects". It covered the Who, What, Where, When Why and How to avoid litigation and resolve issues before they reach the costly legal stage.

"Facing Challenges in your Personal Career" contained four sessions focused on how to work better as an individual and within a group. Starting with "Getting it Done and Done on Time", the first session provided tips on fighting



2013 Annual General Business Meeting



2013 Awards Gala Dinner and Dance



procrastination and increasing efficiency. Then "Understanding Yours and Others Personality Types" walked attendees through a Myers Briggs self-assessment and guidance on understanding personality types. The third session in this track was "Taking the Dread Out of Networking", presenting the Do's and Don'ts of networking along with some techniques to improve this vital business skill. The track wrapped up with "Conflict Management: How to Prevent, Contain

and Resolve" which talked about the positive side of conflict, and how to best deal with the negative.

Between the second and third sessions during lunch, attendees were treated to a review of the URBEE vehicle by APEGM Professional Engineer Jim Kor. He discussed the philosophy behind the first prototype and the plans for the second that will utilize Additive Manufacturing by having more than half of its components 3D printed. Utilizing computer simulation,

high performance computing and biomimicry, the URBEE 2 hopes to drive across the United States on a mere 10 gallons of fuel in 2015.

The Ingenium Conference wrapped up on Friday with the Annual General Meeting along with the Awards Gala Dinner and Dance. The Grand Ballroom at Fort Garry Place was once again sold out for the black tie function celebrating the years' award winners with an evening of fine dining, entertainment and camaraderie.

Team Achievement Award

Magellan Aerospace

For the CASSIOPE Spacecraft Bus Design, Manufacture and Delivery

By APEGM Awards Committee

Before we begin, it is important to know what a 'Spacecraft Bus' is. We are all familiar with scientific satellites which orbit the earth gathering information from space. The satellite consists of two major components; the instruments, which gather the data, and the Spacecraft Bus, or the body of satellite, which protects, supports and transmit data from the instruments. The Spacecraft Bus includes the spacecraft structure, power systems, control systems, computers, thermal protections systems, communication to earth systems, etc.

The Magellan CASSIOPE Spacecraft Bus was designed, built and tested by a dedicated team of about 30-40 engineers and 12 technical staff, right here in Winnipeg. The team was dedicated to this project for a five-year period and was involved in all phases of the project for efficient and effective project delivery. The CASSIOPE Spacecraft Bus satellite is tentatively scheduled to be launched into space in July 2013.

The project is groundbreaking in that it is Canada's first, fully redundant, scientific small satellite, and likely one of the most capable fully-redundant



President Marcia Friesen, P.Eng., Past President Dawn Nedohin-Macek, P.Eng., Team Magellan Aerospace, Executive Director Grant Koropatnick, P.Eng., Awards Committee Chair Ganpat Lodha, P.Geo.

small satellites in the world. The project pushed the boundaries of what was thought to be possible in a small satellite and has dawned a new era in spacecraft performance and reliability in a small spacecraft package for Canada. The small satellite, which is 1.2m in diameter, supports 9 instruments in a very small package, where normally there would be

two or three instruments. The number of instruments represents tremendous value to the client, gathering first-class scientific data at a fraction of the cost of traditional large satellites. The project was delivered on-time and on-budget to their client MacDonald, Dettwiler and Associates of Richmond, BC. In short, this project is a Winnipeg success story.

The project was technically challenging and innovative. Some of the key challenges include innovating new methodologies for space systems, control, thermal, electrical, software and mechanical engineering to realize high performance space science from small satellites. Every aspect of the spacecraft design from the hardware to the software and especially the on-board spacecraft computer

subsystem, was tailored to keep the size, mass and cost within requirements. Each instrument had its own field of view, pointing requirements and power demands, which had to be compatible with other payloads and bus systems. Many of the payloads require deployment sequences, which change the spacecraft mass properties, thus complicating the attitude control modes. Any one of CASSIOPE's

nine instruments would have been a challenge for a single small satellite bus to accommodate. Magellan's ability to accommodate all nine on a single, fully redundant spacecraft is a significant achievement.

The Association is pleased to recognize the Magellan team with the Team Achievement Award for their excellent work on the CASSIOPE Spacecraft Bus Design, Manufacture and Delivery project.

Professional-In-Training Award

Keenan Patmore, EIT

By APEGM Awards Committee

Keenan received his B.Sc. from the University of Manitoba in February of 2010 and his M.Sc. in Civil Engineering in 2012.

Keenan is presently employed by Dillon Consulting Ltd. as an Engineer-in-Training. His interests are primarily in transportation engineering and transportation systems planning.

As a research associate for the University of Manitoba Transport Information Group and prior to his employment with Dillon, Keenan conducted a multitude of projects and assignments for Environment Canada, Transport Canada, Transportation Association of Canada and Manitoba Infrastructure. These projects afforded Keenan experience in a number of transportation related engineering issues including Pedestrian Crossing Control, Green House Gas Emissions, Rural and Urban Traffic Flow Analysis, Highway Safety Performance, Traffic Information Systems and Pavement Design.

Honors and Awards given to Keenan have included the Transportation Association of Canada – Stantec Consulting Scholarship (2011), Canada Institute of Transportation Engineers – Boulevard Transportation Group Ltd. Sustainable Transportation Award (2011), Canadian Institute of Transportation Engineers – John Vardon Memorial Scholarship (2011), Institute of Transportation Engineers, Manitoba



Executive Director Grant Koropatnick, P.Eng., Award Winner Keenan Patmore, EIT, Past President Dawn Nedohin-Macek, P.Eng., Awards Committee Chair Ganpat Lodha, P.Geo., President Marcia Friesen, P.Eng.

Section – Kean Low Memorial Scholarship (2011), Province of Manitoba – Manitoba Graduate Scholarship (2010) and University of Manitoba – John Shewchuck Engineering Design Award (2010).

He is currently a member of the Institute of Transportation Engineers (ITE), Canadian Society for Civil Engineering (CSCE), and Canadian Association of Road Safety Professionals (CARSP) in addition to his membership with APEGM.

Keenan has shown that he is an energetic leader in extra-curricular activities including sports clubs, professional involvement at the University of Manitoba Institute

of Transportation Engineering Student Chapter and in general volunteering within the community. Volunteer experience has included the Can Drive and Sculpture Competition, Engineers without Borders, sandbagging during the 2011 flood along the Assiniboine River, the Christmas Cheer Board (wrapped gifts and delivered hampers), and the Festival du Voyageur where he was a snow slide volunteer.

The Association of Professional Engineers and Geoscientists of Manitoba is very pleased to recognize Keenan Patmore as the winner of the APEGM Professional-In-Training Award for 2013.



Early Achievement Award

Michael Van Helden, P.Eng.

By APEGM Awards Committee

Michael Van Helden is a gifted young Geotechnical Engineer who has accomplished more in his early career than many will achieve in a lifetime. Michael is a Principal and founding partner in a new consulting company, TREK Geotechnical Inc., and very recently completed his Ph.D. in Geotechnical Engineering at the University of Manitoba.

Michael has been recognized with many national awards and honors he has received as well as publications in international refereed technical publications he has authored. At the same time he has also been actively involved in the Consulting Engineers of Manitoba, technical societies, and community groups giving his time as a volunteer.

Michael recently submitted his dissertation in pursuit of his Ph.D. where he has specialized in the use of probabilistic methods for slope stability, a new and critical area of geotechnical engineering practice. His thesis involved the development of a probabilistic site investigation using the Cone Penetration Test using a case study on existing infrastructure for Manitoba Hydro. He has presented his thesis results in numerous venues, including locally sponsored professional development events, three national conferences and at an international conference on soil mechanics in Alexandria, Egypt.



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Due to Michael's exceptional technical abilities, he was invited to join TREK Geotechnical as a founding partner in 2009 and has been an instrumental element of TREK's growth and expansion to 14 technical and administrative staff. Michael serves as the secretary to the board of directors and has played an integral role in the marketing and brand development of the company. His professional maturity and technical growth are exceptional for a professional member of his age and experience.

Michael has always been involved in extra-curricular activities and continues

to contribute to technical and other engineering societies. Currently, he sits on the organizing committee for the upcoming Canadian Young Geotechnical Engineers and Geoscientists Conference as well as the Annual Golf Tournament organizing committee for the Association of Consulting Engineers of Canada (Manitoba Chapter). He has served on the organizing committees of local short courses and the national Canadian Geotechnical Conference held in Winnipeg in 2013.

He has also been involved in fundraising for other community benefit events, including the annual Manitoba Marathon, the MS Bike Tour, the annual Walk for the Cure supporting breast cancer research, and the Winnipeg Humane Society Paws in Motion walk. Michael and his family currently fund the Karel Van Helden Memorial Bursary at Red River College, providing financial assistance to students pursuing Power Engineering. Michael has had numerous other volunteer roles over the years, and plans to continue his contributions to the profession and community throughout his career.

The Association is pleased to present the Early Achievement Award to an exemplary individual – Michael Van Helden, P.Eng.

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Champion of Engineering Education Award

Donald W. Whitmore, P.Eng.

By APEGM Awards Committee

Dr. Don Whitmore, P.Eng., founder of Vector Construction Ltd., has been an outstanding champion of the Faculty of Engineering for many years. A graduate of Civil Engineering at the University of Manitoba in 1959, Don has always remembered where he got his start and believes in giving back.

For several years he served as the Chair of ISIS Canada Research network, (Intelligent Sensing for Innovative Structures). The network, headquartered at the University of Manitoba, was established in 1995 to advance the civil engineering profession in Canada to a world leadership position through the use of advance composite materials and the application of structural health monitoring (SHM) to civil infrastructure, such as bridges. Don's service to this project contributed greatly to its success.

During the Building on Strengths Capital campaign to raise money for the Engineering & Information Technology Complex, Don served as the Chair of the Construction Committee, the most successful committee in the campaign. During the Faculty's centennial year, Don served on the planning committee and was instrumental in making the event the 'Party of the Century.'

More recently, Don was the driving force behind the formation of The Friends of Engineering (Manitoba) Inc., a unique group of top engineering industry leaders who share the U of M Faculty of Engineering's commitment to excellence in engineering education. Friends, an external organization created to advance the Faculty's strategic development beyond what



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can be accomplished with public funding, has approximately 70 members comprised of senior-level executives and leaders who understand the importance of a having a strong, mutually beneficial relationship between all sectors of the engineering profession and the world-class engineering school that serves it's education and research needs.

Don, along with other members of the Friends Board, met with members of the Canadian Engineering Accreditation Board visiting team during the Faculty of Engineering's latest accreditation process, and the team was impressed with the level of industry support and collaboration the Faculty enjoys.

Whenever asked, Don has always been ready, willing and able to lend a hand to the Faculty of Engineering. He has been and continues to be a

constant and wise advisor, and has arguably contributed more to the health of our Faculty over the last 20 years than any other member of our professional community.

In 2005, Don was given the Distinguished Service Award from the University of Manitoba. This award is the highest honour bestowed upon an individual by the University of Manitoba's Board of Governors, and is awarded on the basis of distinguished contributions to the province. Mr. Whitmore is an exemplary leader of the Canadian engineering, construction and business communities and an outstanding Champion of Engineering Education.

The Association, together with the Faculty of Engineering at the University of Manitoba, is pleased to award the 2013 Champion of Engineering Education award to Dr. Don Whitmore.

Outstanding Service Award

Alan Pollard, P.Eng. FEC

By APEGM Awards Committee

Alan received his Bachelors degree in Electrical Engineering from the University of Manitoba in 1976. He continues to be involved with the faculty as an external thesis examiner and industry representative on selection committees. He was granted a Fellowship of Engineers Canada (FEC) in 2010.

He has 35 years experience in telecommunications, electronics, web and database development, and data security and computer forensics. His extensive experience includes 23 years with telecommunications carrier MTS, now MTS Allstream, starting out as a mobile telephone engineer and moving through positions in network technology architecture and new technology development to head up the new product development activity for the company. He also chaired the Data Networking and Technology Thrust Committee of TRILabs, a technology development and commercialization partnership with universities and government.

Alan spent eight years as Director of Technology for the Law Society of Manitoba, the regulatory body for lawyers, improving their data management and security. He has developed several patents in the field of data security and continues to give presentations and workshops in the field of data security.

Back in 1994, while a member of the Public Awareness committee, Alan started a student



Executive Director Grant Koropatnick, P.Eng., Award Winner Alan Pollard, P.Eng., Past President Dawn Nedohin-Macek, P.Eng., Awards Committee Chair Ganpat Lodha, P.Geo., President Marcia Friesen, P.Eng.

competition along with two engineers from Manitoba Hydro, to see if a model bridge could be built from spaghetti. Nineteen years later, that competition is ongoing during the Provincial Engineering and Geoscience Week celebration held during March every year.

He is currently co-chair on APEGM's Investigation Committee and chairs the Legislation Committee. He is also a Director on the board of the APEGM Foundation. Alan was President of the Association (APEGM) in year 2000.

Alan has been a speaker at the Pacific Legal Technology Conference and has presented at the annual conference for Professional Organizers in Canada. He is an associate member of the American Bar Association and of the Naval Officers Association of Canada.

He is also an active participant with local and national technology organizations such as the Manitoba UNIX Users Group.

In his spare time, Alan finds time to volunteer each year at the Manitoba Robot Games and sit on the board of the Aurora Awards for Canadian literature and artistic excellence. He assists local non-profit organizations with their technology and has done work for the Winnipeg Music Competition Festival and the Canadian Association of Professional Speakers.

The Association of Professional Engineers and Geoscientists of Manitoba is pleased to recognize Alan Pollard's continuing meritorious professional service by presenting him the 2013 Outstanding Service Award.

Nominate Your Colleagues for 2014 APEGM Awards

Nominations for deserving Professional Engineers and Geoscientists are open now for seven APEGM Awards for the year 2014.

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Please take time to complete nomination form and forward to the Awards Committee before February 1, 2014. Your initiative and recommendations are essential to recognize and honor deserving professionals from our membership at the next Awards Gala ceremony.

Ganpat S. Lodha, Ph.D, P.Geo., APEGM Awards Committee Chair

Honorary Life Membership

Raymond Hoemsen, P.Eng. FEC

By APEGM Awards Committee

Ray Hoemsen, P.Eng. has held a dizzying array of leadership positions in the public and private sectors, and as a volunteer in his community and profession. Ray is currently the Director of Applied Research and Commercialization at Red River College (RRC). Raised on the family farm near Elkhorn, Manitoba, Ray has spent his professional career as an agricultural engineer working with Manitoba industry, as well as academe. His career has spanned agricultural machinery design, a provincial research council, a high technology spinoff company, university and college technology transfer and commercialization, research park development, a federal granting council and management consulting.

Ray's current and lifetime accomplishments in leading and creating sustained applied research, innovation, and commercialization programs across industry and academic organizations is nothing less than exceptional; his reach and involvement extends past local, to provincial and national communities and his efforts have had positive impacts to not only RRC's reputation and success, but to Canadian businesses and the economy.

Ray has, and continues to be, heavily involved in his professional communities across Canada, but his leadership does not stop there; he also holds, or has held, an astounding number of volunteer leadership positions ranging



Executive Director Grant Koropatnick, P.Eng., Award Winner Raymond Hoemsen, P.Eng., Past President Dawn Nedohin-Macek, P.Eng., Awards Committee Chair Ganpat Lodha, P.Geo., President Marcia Friesen, P.Eng.

from neighborhood organizations, to city, provincial and national athletic groups representing players, coaches, and officials of all levels. Ray has led or been an active volunteer with more than 70 professional, sports and community organizations. He currently serves as a volunteer in organizations such as the Alliance for the Commercialization of Canadian Technology, the Association of Canadian Community College's National Research Advisory Committee, the Canadian Advanced Technology Alliance, the Conference Board of Canada's Innovation Council, the Composites Innovation Centre, Manitoba's Centre for Emerging Renewable Energy,

the Manitoba Foundation for Sport, Manitoba's Vehicle Technology Centre, Rugby Manitoba and Sport Manitoba.

Over his career, Ray has also remained closely engaged with APEGM, serving twice on Council for three-year terms, 12 years on the Investigations Committee, as well as serving on many other committees including the Discipline, EGAIAR Joint Board, Executive/Finance, Consulting Engineer, Awards, Public Awareness, Nominating, Public Awareness and Research and Development committees. In 2005, Ray was recognized for his service to APEGM and was awarded the Outstanding Service Award.

Ray's character, integrity, and passion to better his communities ultimately propel his actions – it is this genuine approach that embodies what it means to be a true leader and professional engineer.

In recognition of his dedicated service to the engineering profession and voluntary service to APEGM, the Association is pleased to confer Honorary Life Membership on Mr. Ray Hoemsen.

"Ray's character, integrity, and passion to better his communities ultimately propel his actions – it is this genuine approach that embodies what it means to be a true leader and professional engineer."

Leadership Award

Gerry Price, P.Eng., Ph.D

By APEGM Awards Committee

Gerry Price obtained his B.Sc. and M.Sc. in mechanical engineering from the University of Manitoba in 1970 and 1972, respectively. After obtaining his Ph.D. in mechanical engineering and applied mechanics from Lehigh University, Dr. Price worked as a scientist for the Defense Research Board in Alberta.

In 1977, Gerry joined the family ventilation equipment business founded by his father. Over the next decade Gerry took over the running of the company and by the mid-1990s he had bought out the remaining shareholder interests in order to fully control the firm. He soon took a bold move and moved into the American market, which had many risk and challenges.

At the same time, Canadian business entered into a deep recession. Between 1987 and 1993 the firm lost two thirds of the Canadian non-residential construction market and for a number of years, the firm had to be creative to save money, keep the doors open, meet payroll and keep the business viable in Canada. The firm's turn around can be attributed to many factors, including its strong research and development and rolling out new products with a short lead time. Even during the most trying times, the company's commitment to customer service and principle-based values remained strong.

Today, Price owns or controls eight companies operating under the Price Group. Last year, those companies had sales of \$331 million, with 12 manufacturing sites and more than 2,200 employees.

During the Building on Strengths capital campaign at the University of Manitoba, Gerry was a tireless volunteer for the fundraising for the Engineering & Information Technology Complex. Not only did he lead the committee that dealt with the Manufacturers in Manitoba, he took a leadership role as a donor. The air distribution system in the building was



Executive Director Grant Koropatnick, P.Eng., President Marcia Friesen, P.Eng., Past President Dawn Nedohin-Macek, P.Eng., Award Winner Gerry Price, P.Eng.

provided by Price Industries. This was Gerry's corporate contribution – Gerry also made a substantial personal donation.

Another contribution is Gerry's work in helping to establish both the Partners Program in Architecture and the Friends of Engineering Program at the University of Manitoba. Again Gerry led by example, being one of the first to join both initiatives and providing both financial and administrative support so that these organizations could grow. But the best example of Gerry's leadership remains his leadership in industry. As his market was shrinking by almost 70%, Gerry led his company to a growth in sales of 15%. It is one thing to be a great leader in good times – it is a much greater achievement to be an exceptional leader in hard times.

Gerry's impact on society has been tremendous. The new EITC stands as an example of one contribution – it impacts every engineering and computer scientist that passes through the school. The Friends of Engineering Program has brought the Faculty and the profession into a much closer and mutually supportive relationship. This relationship

has allowed the Faculty to become the leading design school in Canada. The success of Gerry's corporate initiatives has meant sustained growth of high value, high technology jobs in Winnipeg – over the period of depression that is now finally passing, Gerry maintained and actually grew his company. All three of these leadership examples have helped make Manitoba a better place to live.

Gerry was made a Fellow of the Canadian Academy of Engineering in 2011. This is the highest recognition available to Canadian Engineers. Gerry was presented with the Distinguished Alumni award by the University of Manitoba in 2012, a recognition of his many contributions to the University, City, Province and Country. Gerry and his wife Barb were named Outstanding Philanthropists of the Year in 2011, a recognition of their long time commitments to causes they believe in.

In recognition of his outstanding leadership and scientific knowledge applied to benefit Manitobans and the nation, the Association is pleased to present the Leadership Award to Dr. Gerry Price.



Introducing APEGM's new President Marcia Friesen

By Christine Hanlon

For years, Marcia Friesen has worked closely with APEGM as the liaison for the Internationally Educated Engineers Qualification (IEEQ) Program, through which the Association has partnered with the Faculty of Engineering at the University of Manitoba to deliver an approved qualifications recognition process for internationally-educated engineers. This year she became APEGM's new president.

What initially drew you to a career in engineering?

All through school, I was a good student in several areas and enjoyed different subjects, including languages, math and science, music, design and art. So for me, it was not very clear what I should do after high school. What tipped the scales ever so slightly was having a grade 11 and 12 math and physics teacher who was an engineer and had been an engineering instructor before transitioning into high school teaching. He had a daughter who was just finishing up her engineering degree and he kept encouraging me to try it. At the same time, my parents were involved in social development work and we had lived overseas in Paraguay, so part of me was also interested in having a career with an impact on social development.

After seven years as a consulting engineer in the environmental, agricultural and agribusiness sectors, you joined the University of Manitoba as the director of the IEEQ Program.

Why the transition?

I started my career working with small firms and small groups within bigger firms learning many different parts of a project.



President Marcia Friesen, P.Eng. being presented her certificate from Past President Dawn Nedohin-Macek, P.Eng.

I had a lot of good exposure, for which I am very grateful.

Then, in 2001, I left consulting to pursue a Master's degree in education, focusing on post-secondary teaching and learning and educational administration. I made sure that my final thesis and all my projects were tailored to engineering education and thereby reconnected with several of my former engineering professors.

When I was finishing my Master's degree, APEGM, the provincial government and the University of Manitoba agreed to pilot the IEEQ program and I was shoulder tapped to be the coordinator. As I had an infant and a toddler at that time, the one-year contract was ideal for exploring a new

option. Plus the program really piqued my interest because it combined engineering, education and social development, which was exactly what I was looking for. I enjoyed it and stayed on. The opportunity to be creative, build something from scratch and then grow the program really kept me engaged.

You are a professor as well. Please tell us about this part of your work.

Within the IEEQ Program, I developed and teach a course on professional practice issues that encompasses everything from cultural diversity and integration, to engineering ethics, law and other practice topics in the Canadian context.

I have daily interaction with participants in the program, who come from more than 30 countries, mostly from Asia and central Europe, and increasingly from Africa. I completed a Ph.D. in 2009 and since that time, I have also built up a research program in an area of computer engineering together with a colleague. This is a very different – but very enjoyable – part of my work at the university as well.

What has been your involvement with APEGM and other professional organizations?

When I became the coordinator of IEEQ in 2003, I had regular interface with the Academic Review Committee (ARC) of APEGM as well as with APEGM senior staff, including the executive director, director of admissions and assessment officer who worked with internationally-educated applicants. For a while, I gave an IEEQ update at almost every regular ARC meeting. I was also on an ad hoc committee that examined the National Professional Practice Exam questions to ensure they were relevant to the Manitoba legislation for engineering.

I worked with Engineers Canada on two national advisory committees related to newcomer qualifications recognition initiatives. For three years, I was on the project team of a partnership between Engineers Canada and APEGM and the IEEQ program to promote the IEEQ

program model. Again, I was regularly working with senior staff at APEGM on those project deliverables. Then, two years ago, I was elected to Council.

What challenges do you see APEGM facing?

Issues facing APEGM often arise externally from national trends and initiatives that affect the engineering profession. The Association's strong senior staff responds proactively to significant developments in larger jurisdictions, while diligently keeping Council informed. Some issues that have occupied a lot of Council attention in the past few years include the framework by which to document our professional development and outlining an advocacy framework where the public interest might be at risk. An issue that is currently garnering attention is our response to the national conversation regarding a limited licensee category.

"We identified several issues of high importance to the profession... recruitment and retention in the engineering profession; government relations; and public perception."

As president, what are some of your goals for the coming year?

One issue in which I see myself being actively involved is a process, started last year at the Executive Committee and Council, to define priority areas for APEGM. Collectively, we identified several issues of high importance to the profession, with three issues filtering to the top: recruitment and retention in the engineering profession; government relations; and public perception. Over my year as president, I want to continue the process started by past-president Dawn Nedohin-Macek of engaging the Executive Committee and Council to flesh out how we can manifest these issues in actionable ways, engaging not only Council, but also the membership and profession at large. I ask myself what I can do to get the broader membership excited, engaged and committed to one or more of these areas.

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The Rise and Fall of NATURAL CEMENT PRODUCTION IN MANITOBA

----- Geology Sets the Stage

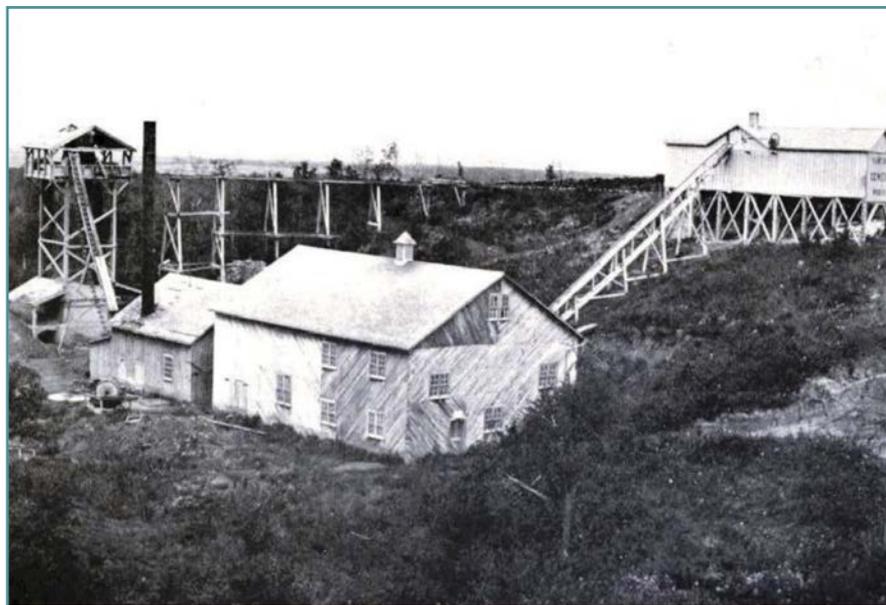
By Christine Hanlon, in consultation with the APEGM Heritage Committee

Numerous rich sedimentary deposits make Manitoba an ideal location for the production of cement, both natural and synthetic. Yet, over the years, development of the industry has proven to be anything but a solid proposition. While some ventures thrived - at least for a while - others foundered under the weight of transportation costs, wavering demand and fickle investors.

Up until 1911, all cement production in the province was comprised of natural cement. Also known as 'hydraulic' cement, natural cement is created by heating naturally occurring limestone, containing up to 25% argillaceous material, or 'cement rock,' in a kiln, to drive off carbon dioxide. The resulting product is then ground into a fine powder.

Manitoba is blessed with an abundance of natural cement rock, an argillaceous limestone with a specific ratio of alumina, lime, silica and iron, used as a binding agent for building materials as far back as the Roman Empire. In 1824, British bricklayer Joseph Aspdin emulated this natural combination to create the synthetic cement mixture widely used in construction today. He named his patented creation 'Portland' cement after a type of building stone that was quarried on the Isle of Portland in Dorset, England.

However, it was natural cement that locally developed Manitoba Union Mining Company at the dawn of the 20th Century. From 1898 to 1904, the company supplied its Arnold Cement



A view of the Arnold natural cement plant in the Pembina Hills along the Canadian Northern (later, Canadian National) Railway (CNR) 1898-1904.

Works (located east of Deerwood) with cement rock from a mine it operated in the nearby 'Babcock' beds, part of the Cretaceous Boyne Member of the Carlile Formation (previously considered to be the Niobrara Formation) on the east slope

of the Pembina escarpment. In 1907, a second natural cement mine and plant, opened on the former Canadian Northern railway line at Babcock, MB, was operated by Winnipeg's Commercial Cement Company until 1924 (MacLean, 1915).

From 1908 to 1910, total natural cement production amounted to 38,395 barrels worth \$47,446 (Dominion Bureau of Statistics, 1957). After the opening of the first Portland cement plant at Fort Whyte in 1911, production of natural cement declined. The characteristics of natural cement were simply too variable to compete with the consistency of its synthetic cousin.

The death knell for natural cement would have tolled even earlier had two other proposed Portland cement plants become reality. But, fraught with insurmountable challenges, projects at Morden and near Treherne never fulfilled their potential.

MANITOBA CEMENT COMPANY

In 1900, the Manitoba Cement Company was incorporated by Special Act of the Manitoba Legislature to establish a cement factory at Morden, Manitoba (Manitoba Free Press, January 17, 1903). Included in the company charter was the authority to construct a 24-km branch railway line from Morden to an area of calcareous shale and chalk in the Pembina River Valley near the US border (Wells, 1905a, p. 63, 64; 1905c, p. 36). These raw materials were to be blended with pure limestone and then heated with coal (possibly from Steep Rock, MB and Estevan, SK, respectively) to produce Portland cement.

Potential usages for the cement included 30,000,000 barrels for the proposed Nicaraguan Canal and 350,000 barrels for the St. Andrew's Locks at Lockport, MB. The company placed several ads in the Manitoba Free Press in January 1903 to advertise shares of the

proposed 1,000-barrel-a-day plant, at \$5 each, for a capital stock of \$1,000,000. According to an article in the January 26, 1903 edition of the Manitoba Free Press, sales of stock and placement of shares at brokers were progressing.

On September 8, 1903, the village of Morden voted in favour of providing the Manitoba Cement Company with a 20-year tax exemption and a free 22-acre site for construction of the plant. Many residents of the town and surrounding area had taken up stock in the company and they were told that the awarding of contracts for construction would begin immediately (Manitoba Free Press, September 10, 1903).

However, as of May 31, 1906, only \$142,000 of stock had been subscribed (with \$42,000 received in cash). These funds permitted the company to acquire the Windygates quarry site on which \$40,000 of development work had already been carried out by William Whyte, James A.M. Aikens and Augustus M. Nanton, directors of the Manitoba Cement Company. Upon completion of the development work – which included borehole drilling and test pitting – the President of the Canadian Pacific Railway, Sir Thomas Shaughnessy approved construction of the railway spur from the proposed plant to the quarry site.

Nonetheless, funds were still inadequate for building the mill and installing the machinery at Morden. At the same time demand was waning, with the US abandoning plans to build the Nicaraguan canal after it purchased the French interests in the Panama Canal at a reasonable cost. In the final analysis,

WINDYGATES

The Pembina Valley's Windygates cement rock deposit was discovered by Samson Walker, President of Walker Oil in Winnipeg. By 1901, three shafts sunk into the deposit revealed that it was at least 100 feet deep and broad enough to last for years (Manitoba Free Press, April 26, 1901). In fact, when Winnipeg City Engineer H.N. Ruttan examined the deposit a year and a half later, he determined that it was virtually "inexhaustible". After sending samples to the Pittsburg Testing Laboratory, he also concluded that the material would produce "Portland Cement of the best quality". Based on these results, William Whyte, Vice-President of the Morden Cement Company, predicted that, with the addition of lime, a 100-years' worth of fine product could be achieved. (Manitoba Free Press, May 31, 1906)

Meanwhile, the Manitoba Cement Company had undertaken two test pits and several borings into a nearby outcrop of the Boyne Member of the Carllile Formation. The exploration revealed horizontally bedded, fine-grained, uniformly slate-grey, speckled shale, underlying finely divided, cream-coloured, soft, dry chalk – the calcareous portion of the Boyne Member. The chalk bed, located east of Windygates, was 30.5 metres long and 3.7 metres thick (Wells, 1905a, p. 63 and 1905 b, p. 27; Goudge, 1944, p. 30).

Composition of the siliceous chalk:

Moisture	01.04
Insoluble matter	13.10
Alumina and iron oxide	10.09
Lime (CaO)	41.49
Magnesia (MgO)	00.63
Sulphur trioxide (SO ₃)	00.15
Undetermined (CO ₂ and organic matter)	43.50
Total	100.00

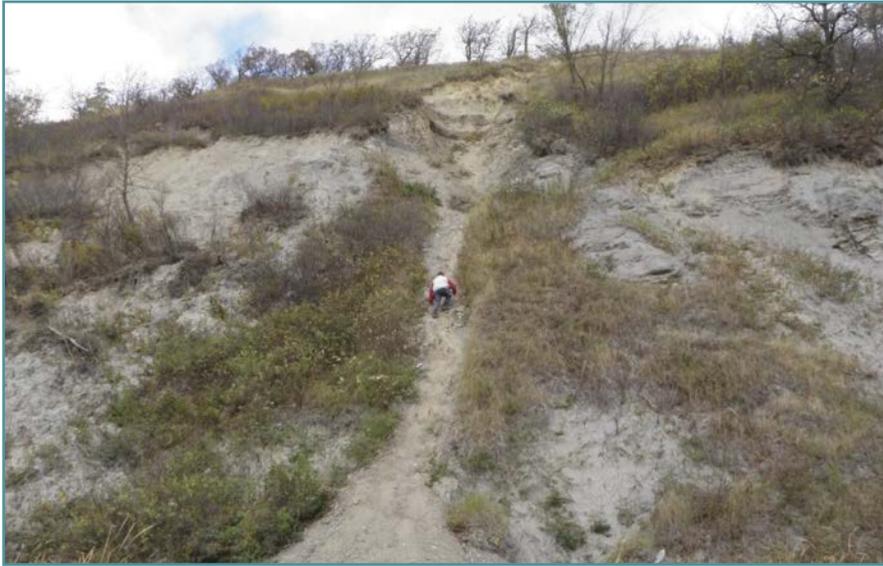
*(Wells, 1905a, p. 63)

Samples from the deposit had been sent to the DeLano Osborne Engineering Company of Toronto which, according to Whyte, "strongly recommended the construction of a cement plant at Morden and stated that they considered the property of the company one of the very best cement propositions ever examined by them". (Manitoba Free Press, May 31, 1906)



The remains of the Babcock cement plant foundations as seen in 2008.





One of the outcrops present along Snow Valley or Roseisle Creek Valley northwest of Miami, Manitoba. On the right are the grey resistant beds that marked the Babcock beds within the Cretaceous *Boyne Member of the Carlile Formation*. Near the top of the 20 m high outcrop section are thin interlayered black shale and white bentonite beds situated at the base of the Pembina Member of the Pierre Shale, which is found directly underlying a 10 m interval of buff glacial till and overburden.

even without these factors, the proposed development was uneconomic because transporting two of the key ingredients – ‘imported pure limestone’ and coal – to make Portland cement in Morden was cost prohibitive.

Treherne Cement Plant and Quarry Site
Just before World War I, there were plans for another cement plant and quarry site 2.4 km west of Treherne, Manitoba. The land was initially leased, and worked for growing wheat by Almon James Cotton, known locally as the ‘Wheat King’ because of the size and quality of his crops. University of Manitoba professor and paleontologist S. R. Kirk subsequently identified the land as containing the necessary soil for a quarry operation to feed the proposed cement plant. However, the project never materialized.

FORT WHYTE

In the end, the only successful Portland cement plant in Manitoba was the one constructed in 1911 by the Canada Cement Company at Fort Whyte, near what was then the southwestern outskirts of Winnipeg. To make Portland cement, a synthetic mixture of alumina, lime, silica and iron is heated to form a substance called ‘clinker,’ which is then ground into

a fine powder (Ames, 1975, p. 129). At first, clinker for the Fort Whyte plant was obtained from Belleville, Ontario. Then in 1913, the plant started producing its own clinker, using limestone from Steep Rock on the east shore of Lake Manitoba and argillaceous materials quarried adjacent to the plant. This quarry left several ponds and small lakes that later became home to the numerous waterfowl that frequent Fort Whyte Centre, a nature preserve and educational facility.

Canada Cement eventually merged with Lafarge Cement North America, becoming Canada Cement Lafarge Inc., eventually renamed Lafarge Canada Inc. Lafarge produced Portland cement at its Fort Whyte Plant until 1987, employing 85 to 100 people. Just down the road, a second plant owned by Inland Cement Ltd. also produced Portland cement with materials from the Steep Rock, operating from 1965 to 1992.

Both plants eventually closed their operations, as demand for cement fell due to recession and the resulting slowdown in the construction industry. Operations for Inland Cement were eventually consolidated in Edmonton. Today, all the cement used in Manitoba is transported across Saskatchewan to Winnipeg for distribution. ☩

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The Faculty of Engineering at the University of Manitoba

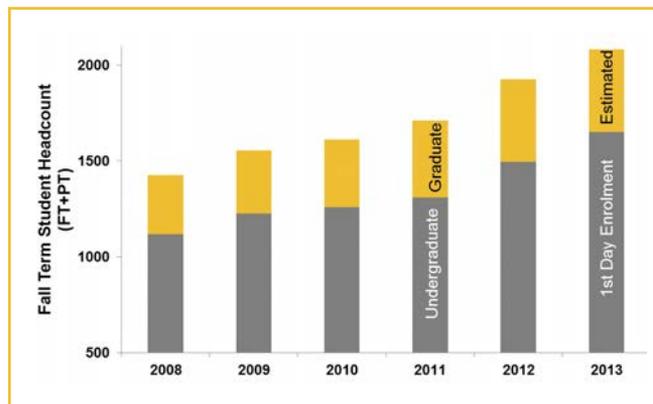
From First Class to Best in Class

By Dr. Jonathan Beddoes, P.Eng., Dean



As we head toward the 2013-2014 winter term at the Faculty of Engineering we have much to celebrate. With the return of students each September comes renewed energy and expectation. Many of us will remember the feeling of a new year of studying engineering bringing a combination of excitement and trepidation. While many of our current students likely share these feelings, I am continuously impressed by the drive and motivation of our engineering students and their outstanding contribution to our Faculty and the surrounding community. This past September was particularly noteworthy in that our enrolment numbers are up over 2,000 students for the first time! We also celebrated Homecoming 2013 on September 27, with the unveiling of our **Celebrating Women in Engineering** wall in the EITC atrium.

Thanks to the continued support of the engineering community and our alumni, the Faculty of Engineering enjoys first class facilities. The completion of the Engineering & Information Technology Complex in 2007 has transformed virtually every aspect of the engineering programs at the University of Manitoba. Since opening the EITC has supported 48% growth in the engineering enrolment allowing us to better meet the demands from today's students to study engineering and provide Manitoba and beyond with graduates that use their engineering knowledge to improve society around them. Likewise the EITC facilities have allowed expansion of the Faculty's trailblazing research program, featuring five core research themes: New Materials & Manufacturing, Biomedical Engineering, Energy Systems, Information & Communication Technologies and Sustainable Prairie and Northern Communities. More than 10% of our Faculty members hold externally supported research Chairs while 22% of our students are in Masters or Ph.D. programs. Most importantly, the EITC serves our students by providing them access to facilities in which they receive a first class engineering education. Recently, the caliber of the EITC facilities contributed to obtaining full six year accreditation of all the BSc (Engineering) programs at the University of Manitoba.



On October 1, we officially opened the new Stanley Pauley Centre, a newly renovated and refurbished building which houses the McMath High Voltage Lab, the Small Vehicles Testing Lab and the Intelligent Power Grid Lab. Later this year or early in 2014 we will celebrate the opening of the new IKO Construction Materials Testing Facility.

Our students are also first class. Their contributions and achievements include the leadership of multiple student groups and design competition teams that compete and succeed internationally as well as multiple recent recipients of prestigious scholarships including Rhodes, Vanier, Schulich and C.D. Howe Scholarships. There is no question that University of Manitoba engineering students are of the highest caliber and accordingly the contributions of all our student groups are outstanding. For all of us in the Faculty it is a pleasure to team up with our students to develop the future leaders for our engineering profession and broader society. When I look at the current crop of students, I am assured that this future is in capable hands and minds.

With the EITC now well established and operating at full capacity, the Faculty of Engineering looks forward to continuing

to work with all our partners in the engineering community to achieve our vision of providing 'engineering programs equal to best available anywhere globally, whose participants reflect societal diversity especially with respect to gender balance, First Nations, Métis and Inuit participation and geographic origin.' In summary, we envisage going from *first class* to *best in class*. With your continuing help and encouragement, we can make our vision reality. ☺



Ribbon cutting ceremony of Celebrating Women in Engineering Wall in the EITC atrium, September 2013.

BUILT TO LEAD

••• Magna's Mission to be a World-Class Manufacturer •••

By Greg Keenan - Auto Industry Reporter

NEWMARKET, ONT. —Reprinted with permission by *The Globe and Mail*

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The threat to DorteC Industries at the turn of the century could be summed up in one word: China.

The Magna International Inc. plant in Newmarket, Ont., had been around since 1985, making door latches for cars, trucks and minivans. Latches take a lot of work to put together, they're easy to package and can be easily shipped anywhere around the world, so Magna's customers wanted the Canadian auto parts giant to open a plant in China to keep costs in check.

Magna complied with the requests and opened a latch plant in Kunshan in 2001. But it kept DorteC open as well. The boom in North American auto production in the first half of the 2000s ensured there was enough work to go around, and the plant was even able to generate higher profits than the average Magna factory.

By 2006, however, the business was being battered by soaring commodity prices and demands by the auto makers for price cuts. Executives at Magna Closures Inc., which oversees both the Newmarket and China operations, turned for help to a retired Toyota Motor Corp. vice-president to teach the company how to develop a first-rate manufacturing system.

“DorteC is at the head of the class. It is also defying the notion that low-cost countries have sounded the death knell for manufacturing in Canada.”

Seven years later, DorteC is at the head of the class. It is also defying the notion that low-cost countries have sounded the death knell for manufacturing in Canada – so much so that side-door latches assembled in Newmarket are shipped from 'high-cost' Canada to auto makers in China, Thailand and other low-cost regions.

Its turnaround holds lessons for other Magna plants as the company puts its so-called world-class manufacturing system in place at more than 300 auto parts plants around the world. DorteC is the plant Magna points to any time a chorus of “Canada can't compete” breaks out. But the factory is also a beacon for other

Canadian manufacturers that are struggling to stay competitive as they contend with a high dollar and globalization. At stake are 1.5 million jobs and the billions of dollars those jobs contribute to the economy annually.

“If you're efficient, if you're world class, you can compete and your customers will want to use you in high-cost countries to supply their product,” says Frank Seguin, president of Magna Closures.

A visit to Newmarket last December by Benson Wong, the China plant manager, showed just how far DorteC has come.

“He came over to here to benchmark and he saw a latch going together every 3.2 seconds and he says ‘I'm in trouble;’” recalls John O'Hara, vice-president of North American operations for Magna Closures. “He left here thinking: ‘I've got some work to do.’”

To succeed in the way that DorteC has, manufacturers need to focus intently on the design of their products, integrate information technology into all aspects of their manufacturing and harness the knowledge of their employees, says David Wolfe, a University of Toronto public and economic policy professor. “It's critical if they want to survive,” Prof. Wolfe says.

All those elements are part of Magna's system, which borrows heavily from the fabled Toyota production system, with its emphasis on lean manufacturing, elimination of waste and relentless focus on quality.

Upgrading all Magna operations to meet world-class manufacturing standards represents a key pillar underpinning the company's future in the hyper-competitive auto parts business. “Our vision is to be the best manufacturing company in the world in all the operations we have,” Magna chief executive officer Don Walker says in an interview in DorteC's conference room, where one wall is lined with the various types of latches DorteC employees put together.

“Ultimately ... if we're not going to be the best, we won't be successful as a company.”

THE TOYOTA INFLUENCE

A door latch is among the many unglamorous components of a car that drivers and passengers never see. But a single latch can contain up to 80 individual parts and they have become

more complex in recent years with the proliferation of power sliding doors on minivans and power liftgates on minivans and crossovers.

"They're very, very critical and highly engineered," Mr. Seguin says.

Magna never discloses publicly the costs of the thousands of parts it sells to auto makers, but on such a small component as door latches, reducing that cost by even a penny makes a big difference. Taking one second out of the time it takes to assemble them also matters. That's where Yasumasa Sano, the retired Toyota vice-president, comes in. When the Magna Closures executives began to look at the operation in 2006 – before the near collapse of the auto industry in 2008 – Mr. Sano would visit DorteC every three months, giving advice on how to improve quality and put lean manufacturing techniques in place.

DorteC is a fairly typical auto parts plant inside, although its bright lights and cleanliness distinguish it from many other factories in Ontario's manufacturing heartland. That's one of the more obvious influences of the Toyota production system. During a recent 45-minute tour of the factory, Mr. O'Hara, Mr. Seguin and other Magna Closures executives explained how the rest of it played out.

Assembly lines were shortened. On some lines, several workstations were combined into one to reduce the amount of time it takes to create a latch.

There are no motorized forklift trucks – in part because it permits narrow aisles between assembly cells, which reduces the amount of wasted floor space and enables it to be used for new machinery.

All the employees were empowered to stop assembly lines if they spotted a quality problem.

The plant established standard practices "so that we produce the same product the same way across multiple shifts or multiple lines," Mr. O'Hara says.

Quality improved by 60 per cent, capital spending on new projects fell by 20 per cent and the changes cut the amount of floor space being used by 15 per cent.

The plant was one of the few Magna operations that remained profitable through what became a perfect storm for the company and the auto industry as a whole, as North American vehicle production plunged to 8.7 million in 2008, less than half the peak hit in 2000. DorteC's ability to stay profitable "was a sign that we got it before it was too late," Mr. O'Hara adds.

But the slump also brought lessons, teaching executives that buying flexible equipment is essential so that when orders fall because a customer cuts production, the plant doesn't have to keep cranking out latches to keep expensive machinery in use. Continuing to produce parts so that equipment isn't sitting idle creates excess inventory, one of the cardinal sins in Toyota's manufacturing ethos.

THE WORKERS BUY IN

Magna also adopted another element of the Toyota production system for use in its world-class manufacturing program – employee suggestions. In 2009, employees offered 27 suggestions to streamline production processes, improve ergonomics or eliminate waste.

By last year, that number had grown 17-fold to 473 ideas – more than 98 per cent of the workers on the factory floor had contributed. For example, workers suggested reducing the size of some of the racks next to an assembly line so less material has to be stored there, opening up floor space for other use.

There are monetary rewards for suggestions, a policy that catches the attention of Prof. Wolfe. "When you give [employees] a greater stake in how the organization is working, the results always reflect it," he says.

After all the changes, DorteC has increased productivity by 25 per cent since 2006, even though auto production is still far from pre-recession levels.

"If you're efficient, if you're world class, you can compete and your customers will want to use you in high-cost countries to supply their product."

The numbers highlight that the plant has become world class, but when asked how he knows it, Mr. O'Hara points to a change in attitude that can't be quantified: "When people stop talking about how good they are and how good we are and just look at what needs to be done next. How do we continually improve?"

The world-class manufacturing project is one of three critical priorities at Magna, Mr. Walker says. The others are innovation and a leadership development system that seeks to identify the company's best people. And while he believes everyone in the company is convinced of the need for continuous improvement, Magna as a whole is about halfway to where he wants it to be.

The Magna Closures executives say the streamlined production system will have a dramatic impact in reducing costs and improving efficiency at other divisions that make much larger parts, such as Cosma International Inc., Magna's metal-bashing subsidiary that makes frames and chassis components and the division that makes engine and transmission parts.

And Mr. Walker has kicked off a program to examine every action taken at the company's head office in Aurora, Ontario, studying why activities are done, whether they can be done more efficiently and if overhead costs can be cut. "At the end of the day, we're paid by our customers to make parts," he says. "We're not paid to run any office anywhere, so really all value added comes from the shop floor." ☺



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Do You Want to Know a Secret?



By Danny Mann, Ph.D., P.Eng.
Professor & Head, Biosystems Engineering

The Biosystems Engineering program at the University of Manitoba is no longer new, but the term 'Biosystems Engineering' still seems to be a mystery to some in the engineering community in Manitoba. It is not our intent to keep this program a secret; therefore, the intent of this article is to 'let the cat out of the bag.'

The Biosystems Engineering program emphasizes the application of engineering principles to biologically-based systems (i.e., systems that include plants, animals, microorganisms, or humans). The program has been designed to give students knowledge of the fundamental principles of engineering and to introduce biological concepts to enable these engineers to successfully interact with relevant professionals when solving engineering problems involving biological systems. The Department of Biosystems Engineering at the University of Manitoba offers five specializations (agricultural, biomedical, bioprocessing, environmental, and sustainable building systems) that can be taken within the Biosystems Engineering program. We (speaking on behalf of the professors in the Department of Biosystems Engineering) strongly believe that a basic understanding of biological concepts is critical to each one of these five areas of specialization. We do not offer a biology degree or a biosystems

degree – rather we offer a Biosystems Engineering degree. The program is fully accredited by the Canadian Engineering Accreditation Board.

SPECIALIZATIONS IN THE BIOSYSTEMS ENGINEERING UNDERGRADUATE PROGRAM

Agricultural Specialization

Challenges remain in the production of food for a world of ever-increasing population. There is a role to be played by engineers to increase the efficiency by which food is produced. Examples include developments in the design of machinery for food production and the design of controlled environments for both plant and animal production.

Biomedical Specialization

The biomedical specialization provides engineers with knowledge of human anatomy and physiology to enhance the understanding of the role to be played by engineers in specific areas within biomedical engineering such

as rehabilitation engineering, clinical engineering, medical imaging, and orthopedics.

Bioprocessing Specialization

The bioprocessing specialization is intended for engineers interested in areas such as production of plant-based pharmaceuticals or developing viable energy sources using either biological processes and/or biological materials (such as biomass).

Environmental Specialization

There are numerous environmental issues faced by society. The environmental specialization provides engineers with the knowledge to predict environmental impacts due to human developments and to solve problems associated with the environment (soil contamination, pollution of rivers and lakes, air pollution, wastewater treatment).

Sustainable Building Systems

Specialization There is a growing desire to reduce the ecological footprint associated with residential and commercial buildings. Engineers will gain knowledge in sustainable building practices and the use of renewable energy sources in building systems.

An innovative aspect of the Biosystems Engineering program is the capstone experience, that has been termed the 'Design Trilogy.' The capstone course in any engineering program is intended to help bridge the gap between the

The Biosystems Engineering program graduates engineers who are well-prepared to tackle a broad range of engineering problems.



university classroom and the work environment of the practicing engineer. Capstone courses may be organized in many ways, however, a common element is the opportunity to work on a substantial design project.

The Design Trilogy is unique and innovative in three ways. First, the Design Trilogy provides a capstone experience that is spread over three courses. Students get introduced to the capstone experience in second year when they first enter the program and then have a year-long opportunity during the final year of the program.

The second innovation is that the teaching of technical communications has been fully integrated into the Design Trilogy rather than students taking the stand-alone technical communications course. This approach enables the opportunity to practice what has been taught during preparation of a report to be submitted to an industry client.

The third innovation within the Design Trilogy is that students have the opportunity to build a prototype of what they have designed. The typical university capstone experience ends with a conceptual solution that is described in a written report. In such a model, the engineering student never gets to experience the process of taking the design from the office to the shop. For the past four years, we have provided this experience to Biosystems Engineering students.

The final third of the Design Trilogy is dedicated to fabrication in the shop. Although there is assistance available from the shop technicians, the students are responsible for fabricating their prototype. This has proven to be an exceptional learning experience for the students. They gain an appreciation for basic shop skills. They have learned that their designs on paper often had flaws that became evident when fabrication was attempted. Finally, they gain an appreciation for the importance of details for assembly of the prototype.

The Design Trilogy plays a key role in helping us to prepare engineering graduates prepared for the challenges of the real world. For many years, we have heard from industry that engineers need good 'soft skills' to complement technical competence. We have taken these concerns to heart and created a learning experience that enables the development of such skills.

There, the secret is out! The Biosystems Engineering program graduates engineers who are well-prepared to tackle a broad range of engineering problems. It would be great if you could help us to further spread this news with your colleagues or with your human resources department. The next time you have opportunity to speak with a graduate of the Biosystems Engineering program, be sure to ask him or her (did I mention that we have approximately 50% women in the program) about their most memorable experience as an engineering student.

We see ourselves as a growing Department with an exciting future. However, we know that our future success depends upon our ability to be relevant to both industry and our

society. We welcome partnership with the organizations that you represent. Partnership may take the form of providing a co-op placement for an undergraduate student, suggesting a student design project for our Design Trilogy, providing an internship for a graduate student, research collaboration with one of our professors, interacting with students in the lab as an engineer-in-residence, or participation in an advisory group for the Department of Biosystems Engineering. As you see, we are receptive to creative ways to partner with your organization. If you would like more information about the Biosystems Engineering program at the University of Manitoba, do not hesitate to contact me by phone at 474-7149 or by e-mail at Danny_Mann@umanitoba.ca. ☎

Research Labs in the Department of Biosystems Engineering

Alternative Village: An outdoor laboratory dedicated to alternative energy technologies and building envelope systems. The centrepiece of the Alternative Village is the Straw-Bale Building, with numerous other small, innovative structures.

Agricultural Ergonomics Lab: Has been developed to research the ergonomic and safety issues associated with agricultural machines.

Biofuels, Biotechnology & Fermentation Lab: Dedicated to the biological production of biofuels and bioproducts (ethanol, hydrogen, bioplastics) using various sources of biomass as feedstock.

Bioprocessing Engineering Lab: Processing, drying, and evaluating food using various innovative systems.

Computational Optimization and Geometric Modeling Lab: Use of computational methods for biomedical/biological imaging, pattern recognition, spectroscopy, and hyperspectral imaging.

Grain Storage Research Lab: A 1400 m² state-of-the-art laboratory dedicated to research on grain storage and handling.

Imaging and Food Quality Assessment Lab: Focuses on providing safe and healthy food to humans and livestock through improved imaging.

Odour Research Lab: Quantification and analysis of odour samples, and evaluation of various odour-reduction technologies.

Soil Dynamics & Machinery Lab: Machine-material interactions associated with soil engaging tools and processing of agricultural fibres.

Soil & Water Engineering Lab: Dedicated to the areas of irrigation, drainage, remediation of contaminated soils and groundwater, and instrumentation for soil and water monitoring.

Waste Management Lab: Dedicated to treatment of livestock waste, municipal wastewater, and industrial wastewater. A pilot-scale anaerobic digestion facility is located at the Glenlea Research Station.

ENCOURAGE. ENHANCE. EMPOWER.

By Andrea Watts, P.Eng.

MCWESTT 2013 “MOMENTUM: Encourage. Enhance. Empower.” held on May 9, 2013 in Winnipeg, Manitoba was a great success. Inspired by the success of a similar national conference, CCWESTT (Canadian Coalition of Women in Engineering, Science, Trades and Technology), a group of Manitoba women from these professions came together to organize a one-day conference. MCWESTT 2013 offered participants a high quality program with opportunities to learn, share experiences, network, and recharge. This was the first time MCWESTT was held.

So what exactly is MCWESTT? MCWESTT or the Manitoba Community for Women in Engineering, Science, Trades and Technology is a group of women from Engineering, Science, Trades and Technology who saw a need in our community for professional development, support, and celebration. MCWESTT is not an independent professional organization, but a group of women that specifically came together to plan this one-day conference.

The conference program consisted of



three keynote speakers, a panel discussion and twelve breakout sessions. The 230 participants, including over 30 volunteers, and 15 presenters, were primarily from Manitoba, with a few attendees from other provinces. The 230 participants reflected a diverse background of professions from a variety of industry, academic, and public sector workplaces. The conference theme focused the event on the Momentum that women have gained in these professions and the unique contributions that women make. Lively discussions full of Encouragement for fellow professionals could be heard during breaks throughout the day. The program was selected to provide numerous opportunities to Enhance existing skill sets with topics ranging from negotiation skills, to hiring practices.

The conference featured many Empowering women including three keynote speakers: Myrna Driedger,

MLA for Charleswood; Brenda Tjaden Lepp, Co-founder and Chief Analyst, FarmLink Marketing Solutions; and Debra Jonasson-Young, President, People First Consulting Services.

Manitoba comedian Aisha Alfa, was the conference’s Master of Ceremonies, keeping the attendees laughing and celebrating the common strengths that unite this special community. The conference was held in the beautiful facilities at The Fairmont Winnipeg. In addition to the superb program, participants were treated to a hot breakfast and lunch, and some sweet treats to accompany their coffee breaks.

The Association of Professional Engineers and Geoscientists of Manitoba (APEGM) and the Natural Sciences and Engineering Research Council of Canada (NSERC) partnered with the conference planning committee for support. Without



MCWESTT 2013 CONFERENCE COMMITTEE

Andrea Watts, P.Eng., Transport Canada, (Conference Chair)

Chantelle Cabral, Association of Professional Engineers and Geoscientists of the Province of Manitoba

Annemieke Farenhorst, Ph.D., NSERC Chair for Women in Science and Engineering – Prairie Region, Faculty of Agricultural and Food Sciences, University of Manitoba

Kaitlin Fritz, EIT, Manitoba Hydro

Lindsay Melvin, M.Sc., P.Eng., Manitoba Hydro

Jenna Rapai M.Sc., University of Manitoba

Heather Smart, P.Eng., University of Manitoba

Christine Wu, Ph.D., P.Eng., NSERC Industrial Research Chair, Faculty of Engineering, University of Manitoba

Diana Vander Aa, Association of Professional Engineers and Geoscientists of the Province of Manitoba

these partners or the generous MCWESTT 2013 sponsors, this conference would not have been possible.

It is also important to mention the role that the University of Manitoba – Faculty of Engineering and the NSERC Women in Science and Engineering (WISE) Prairies Chair had in encouraging the student attendance at the conference. Because of their financial support, over 40 students received free enrollment for the conference, an opportunity many of them could not otherwise afford.

Similarly, the volunteer support

provided by the over 30 volunteers to plan, organize and ensure a smooth operation of MCWESTT, was generous, creative, and inspiring. These volunteers were vital to the conference's success.

Feedback received and the energy maintained throughout the conference indicates that not only was the conference a success, but that the attendees left MCWESTT 2013 caught up in the MOMENTUM.

Now it's time to start planning the 2nd biennial MCWESTT conference... MCWESTT 2015! If you are interested in



joining the MCWESTT 2015 Conference Committee, please join us at APEGM on Tuesday, February 5th, 2014 from 12:00 – 1:00 pm. ☺

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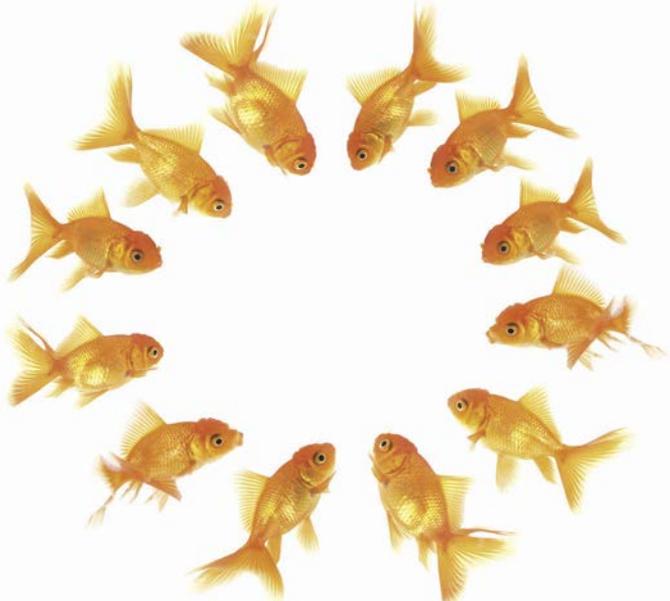

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Digvir S. Jayas, P.Eng., Vice-President (Research and International) and Distinguished Professor at the University of Manitoba has been elected as a Foreign Fellow of the National Academy of Sciences, India for his contributions to global grain preservation through research

and innovation. He is the first Manitoban and only seventh Canadian to be bestowed this honour since the establishment of the Academy in 1930.

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Leaf's Old Home and Winnipeg Museum Win Steel Awards

This article was Published June 2013 in *Canadian Consulting Engineer*.

The Canadian Institute of Steel Construction's Ontario Region gave out its awards at a gala dinner held in the Ritz Carleton Hotel in Toronto on June 6.

Two awards of excellence were given. One was in the Engineering category and went to the Loblaws & Ryerson University's Redevelopment of Maple Leaf Gardens. The engineers were exp Services. The architects were Turner Fleischer and BBB, and the contractor was Buttcon.

The redevelopment of the 1931 iconic ice hockey arena in downtown Toronto at Carlton and Church Streets has seen it transformed into a multi-use complex that combines a retail store for Loblaws and a new Athletic Centre for Ryerson University. Many of the design challenges related to it being a heritage building where significant elements had to be preserved.

The second award of excellence was in the category Projects Constructed Outside of Ontario and went to the Canadian Museum for

Human Rights in Winnipeg. Yolles/CH2M HILL was the engineer on the building, whose structural complexity includes highly stressed connection points between steel forms and concrete walls and large column-free spaces. Architects were Smith Carter and Antoine Predock. The contractor was PCL.

Two awards of merit were given in the Engineering category. One went to the Redevelopment of the Toronto Sun Media Site at 333 King Street East. The engineers were again exp Services. They had to reinforce the existing steel columns through existing floors, carrying the new forces down to new foundations. The architect was pellow + associates, and the owner and contractor was First Gulf Corporation.

Another award of merit in the Engineering category went to the Re-Decking and Widening of Hogg's Hollow Bridge at Highway 401, Toronto. This project for the Ontario Ministry of Transportation is one

of the largest bridge engineering projects using primarily structural steel in recent years. A total of over 1,200 tons of high-grade 350WT steel used, with installation amidst the busiest traffic conditions in the country. Engineer was Morrison Hershfield and the contractor was the Miller Group.

In the Architecture category an award of merit was given for The Abilities Centre, a 130,000 sq.ft. therapeutic, recreation and community complex in Whitby. Halcrow Yolles is the engineer of a structure that has various angular, orthogonal and curvaceous geometries. B+H is the architect. The contractor was Bondfield Construction.

Another award of merit in Architecture went to the Richard Ivey School of Business at the University of Western Ontario. The 270,000 sq.ft. quadrangle structure has complex geometric forms in three storeys. Yolles, a CH2M HILL company is the engineer, and Hariri Pontarini are the architects.

In the Green Buildings category, the Environment 3 EV3 building at the University of Waterloo won an award of merit. The engineer was WalterFedy and the architect was Pearce McCluskey. For the construction of this LEED Platinum building, a 'staggering' 800 tons of steel was delivered and erected in four days.

The Algonquin Centre for Construction Excellence at Algonquin College won an award of merit in a category "Projects Converted into Steel." The structure was originally conceived as cast-in-place concrete but was changed to structural steel because it saved time in constructing the classroom tower. The architect was Diamond and Schmitt and the contractor was EllisDon. No engineer was named.

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Scrapped Canadian Study Found Early Promise for Safer Truck Design

By Renata D'Aliesio

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It was a study with life-saving potential. For the first time, federal government engineers were examining whether side skirts, attached to trucks to reduce fuel costs, could also prevent cyclists from getting crushed under the big rigs.

With funding secured and researchers in place, the innovative study was about to shift into its second phase when Transport Canada suddenly scrapped further testing last fall. The transportation regulator contended there was no point in moving forward because it had found no research to show truck skirts could make streets safer.

But that's not what the engineers found. A copy of the study's first phase, obtained by *The Globe and Mail* through access-to-information legislation, reveals the National Research Council (NRC) reported promising findings from its initial analysis of side skirts. All three models tested prevented bicycles from sliding underneath a transport truck in a collision – a dangerous scenario that has wounded or killed scores of cyclists in Canada over the past decade.

Transport Canada is standing by its decision to halt additional testing, but the study's sudden cancellation has irked some safety advocates. Without more testing, it's impossible to determine whether lightweight skirts can serve the same safety purpose as sturdier side guards. Both cover the side gap between a truck's front and back wheels, but skirts are designed to make trucks more aerodynamic while guards, generally a drain on fuel, bolster the safety of cyclists

and pedestrians by preventing them from tumbling beneath a truck during a crash.

"It's disappointing that Transport Canada hasn't moved forward with this [study]," said Ontario's interim chief coroner Dan Cass.

The NRC, a government research agency, declined to make its lead engineer on side skirts available for an interview. In an e-mailed statement, NRC engineer Jeff Patten said he believes these were the first tests of their kind in the world.

"Although these tests were a critical step in understanding the behaviour of side skirts when impacted by a bicycle, they are but one step in what must be a rigorous multistep process," Mr. Patten noted.

Transport Canada spokeswoman Karine Martel said the decision to cancel the study was made at the scientific and technological level and not by Transport Minister Denis Lebel.

"The intention of the proposed investigation was to study whether side skirts might provide ancillary safety benefits for pedestrians and cyclists," Ms. Martel said in an e-mail. "A decision was made not to proceed with the study because the department was unable to find any research indicating that a similar technology, specifically side guards, was effective at improving pedestrian and cyclist safety".

Side guards have long been mandatory on most trucks in Europe and Japan. According to an earlier NRC study, completed for Transport Canada in 2010, cyclist deaths and serious injuries involving the side of trucks dropped substantially in Britain

– deaths by 61 per cent and serious injuries by 13 per cent – after side guards were introduced. Transport Canada said there could have been other factors that contributed to the decrease in injuries and fatalities.

Dr. Cass has a different view. "I don't know what more evidence is needed before one just moves forward to do something which is known to save lives".

The Ontario chief coroner's office called for national side-guard regulation last year after reviewing 224 cyclist and pedestrian fatalities. Twenty-nine of the deaths involved heavy trucks, with nearly half of the victims dragged, pinned or run over after striking a truck's side.

The NDP and Liberals have both tried to push the side-guard issue onto the legislative agenda with separate private member's bills, but their bids to have truck guards regulated have not been successful.

The Canadian Trucking Alliance has opposed mandatory side guards, suggesting bike lanes and road-sharing campaigns are more effective at improving safety. The industry group, however, has encouraged its members to install side skirts because they reduce greenhouse-gas emissions, noted Stephen Laskowski, the organization's senior vice-president. Skirts are more common on tractor-trailers in North America, but they can also aid large straight trucks.

Which is why Transport Canada's study of the safety potential of side skirts was so intriguing: Could truck skirts save fuel and save lives?

The first round of testing, which cost about \$100,000, involved mounting a

block of steel to a bicycle's saddle to mimic the weight and centre of gravity of an adult rider. The mountain bike was then rammed into the side of a stationary semi-trailer at a speed of about 22 kilometres an hour.

"Under these conditions, the testing demonstrated that all three side skirts prevented the loaded bicycles from entering under the trailer. Furthermore, the bicycles did not become wedged underneath the skirts," states the NRC side-skirt report, completed in April, 2012 for Transport Canada.

The report stresses a lot more research and testing are needed to determine whether skirts can indeed protect cyclists in real life. A second phase of study was scheduled to begin last fall. NRC engineers

were going to look at how the skirts performed in cold weather. Would they still prevent bikes from sliding under the big trucks or would the skirts, which are usually made of plastic or aluminum, break apart?

Transport Canada had set aside \$200,000 for this round of testing, tapping the regulator's Ecotechnology for Vehicles Program, a five-year, \$38-million initiative to test technologies that have the potential to improve safety and the environment. According to NRC research, side skirts increase driver stability and reduce a semi-trailer's annual fuel consumption by 4 per cent to 7.5 per cent. The skirts cost between \$750 and \$3,600, an investment recoverable in four months to two years.

While the safety benefits of truck skirts remain unclear, proponents of

side guards point to the European experience as evidence truck guards work.

"Side guards are proving to save lives," said Jeannette Holman-Price in a phone interview from England. Her 21-year-old daughter, Jessica, died when a dump truck ran over her in the winter of 2005. The truck had clipped Jessica's brother as the siblings stood on a snow bank in Montreal. Jessica managed to push him to safety, but in doing so, she slid beneath the truck, through the side gap, and was crushed.

Their mother has been advocating for a side-guard regulation ever since.

"When you look at the event that destroyed my life and my family's life it was all because of the lack of a single piece of machinery that exists on every [truck] over here".



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The Reconstituted Winnipeg Building Commission

By Christine Hanlon

When an engineer, architect, builder or developer has a difference of opinion with the City of Winnipeg related to the interpretation of building code or the Winnipeg Building By-law, a request can be made to the Winnipeg Building Commission (WBC) for a recommendation. Industry professionals may be familiar with work of the Commission when it was active more than a decade ago. After a period of inactivity, due to a lack of issues brought forward, the Commission has been now revived with a revised mandate.

The WBC was initially established through the Winnipeg Charter to fulfill a number of mandates outlined in the Winnipeg Building By-law (18.4.1). For about a decade, starting in the 1990s, the WBC primarily acted as a technical appeal body, weighing in on orders to comply with the Residential Buildings Fire Safety By-law 4304/86, concerned with building standards for older, residential multiple-family or converted single-family detached dwellings. Eventually, the number of issues brought to the Commission dwindled, with the last meeting held in 2008, after which no further applications were made.

Then, on March 21, 2012, City Council amended the Winnipeg Building By-law, expanding the authority of the WBC to make recommendations on technical building, electrical and fire code matters associated with new construction. The expanded mandate also included situations involving alternative solutions for compliance with construction-related bylaws.

“The Commission deals with applications for an interpretation of a by-law or code requirement, usually because an issue has been flagged during the plan examination process

or an inspection during the construction process,” says John Guenther, one of the WBC’s nine members.

For instance, one of the matters reviewed by the Commission over the past year revolved around barrier-free commercial washroom requirements. In certain situations, an architect might feel that an alternative solution to providing barrier free access might make more sense than following the prescriptive requirements of the building code.

“Sometimes, there are gray areas in the interpretation,” explains Guenther. “This process will help ensure a project complies with the intent of the by-laws and codes before it is completed. The recommendation could also serve as useful reference for any other projects moving forward”.

In addressing requests for interpretation, including reviewing an alternative solution to decide whether it meets the intent of code, the Commission acts as an impartial third party. “People on the Commission do not represent any company or group,” notes Guenther. “At the same time, it is composed of people with expertise from across the industry”.

The nine members of the WBC are qualified by experience and training to consider matters pertaining to building design and construction. All members must be in active practice, with at least 10 years of experience in their occupation. They are appointed to the Commission for a period of three years.

The composition of the WBC includes two members of APEGM of which one must be a Civil or Structural Engineer, and the other a Mechanical or Fire Protection Engineer. The Commission also encompasses two members of the Manitoba Association of Architects, one from the Winnipeg Construction Association and one from the Manitoba Home Builders Association as well as

the senior Fire Officer of the City of Winnipeg Fire Paramedic Service. There are also two members at large, with expertise in the application of the Codes or the Electrical Code.

Applicants seeking a recommendation from the WBC on a particular issue, should do so before a formal decision is made by the City of Winnipeg regarding interpretation of Code, alternative solutions or requirements to correct construction defects. A formal letter of request outlining the issue to be addressed must be submitted to the WBC along with the \$1,500 fee. The Commission meets once a month (although it may be possible for special meetings to be arranged if project timing is an issue).

At the meeting, applicants, usually represented by an architect or engineer, make their presentation to the Commission. “The Plan Examination Branch would also provide their interpretation and position on the questions,” continues Guenther, adding that the Commission can ask questions of either party. After that process is complete, the Commission deliberates in private. The WBC then determines whether to request more information or to move forward and deliver its recommendation.

“The Commission tries to render its decision the same day, but if more information is required, it could take longer,” notes Guenther.

The decision is formulated as a recommendation. There is a possibility that the Designated Employee of the City of Winnipeg responsible for ensuring compliance to building and electrical codes might not accept the recommendation. Any final decision of the Designated Employee can be appealed to the City of Winnipeg’s Standing Policy Committee on Property and Development.

What Makes an Ideal Volunteer?

by Diana Vander Aa, APEGM Volunteer Coordinator

A volunteer can be defined as a person who freely offers to take part in an enterprise or undertake a task without monetary gain. Volunteers are people who are professional enough to contribute to an organization without compromising their own identity outside of their duty. Volunteers use their maturity to contribute to their cause, but are wise enough to step aside and allow others to contribute in their own unique way. True volunteering is not an obligation.

Characteristics of a Good Volunteer are:

- Professionalism • Maturity • Self-awareness
- Wisdom • A Team player • Committed
- Flexible • Knowledgeable and Experienced
- Realistic

Values for Volunteer Involvement

Volunteer involvement is vital to APEGM and its self-regulation of both the engineering and geoscience professions as mandated by The Engineering and Geoscientific Act of Manitoba. APEGM

currently has more than 200 volunteers sitting on more than 20 committees. These volunteers assist in promoting change and development of both professions.

If you were to ask a volunteer why they are volunteering, you will get different answers. It could be court or employer mandated, for professional development, or for personal fulfillment. Whatever the reason there is always one common string, volunteer involvement is personal. As the Canadian Code for Volunteer Involvement states, "Volunteer involvement provides the opportunity for individuals to engage in terms of their personal preferences and motivations". However, The Canadian Code of Volunteer Involvement goes further to state, "Volunteers have responsibilities. Volunteers make a commitment and are accountable to the organization. Volunteers will act with respect for the cause, the stakeholders, the organization, and the community. Volunteers will act responsibly and with integrity".

Guiding Principles for Volunteer Involvement

Volunteering ones time can be a selfless act. It allows others a chance to learn from a volunteer's experience, share in the comradery of those common experiences, and allow one to just feel good about themselves. However, a sign of a good volunteer is someone who does not allow their time served to compromise their professional or personal health.

Good health and work-life balance are achieved through the combination of meaningful work, service to others and loving family relationships. Over-commitment can sometimes lead to unhealthy stress levels.

APEGM recognizes that volunteers are vital to the running of our Association and are committed to providing the necessary tools for volunteers to succeed in their roles as both a professional and a volunteer. If you have any questions or comments about volunteering please feel free to contact me at volunteer@apegm.mb.ca or visit www.apegm.mb.ca/volunteer.html. ☎

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What Does it Take to Be Competent?

For some time, now, I have been thinking about the evolution of a profession. Some of these thoughts would probably sound heretical to those who are entrenched in the church of engineering. However, the longer these thoughts have grown, the more I believe in their strength. Likely, the main reason that I now feel comfortable expressing these opinions publicly is the fact that others are expressing thoughts of a very similar nature.

Recently, Richard Steinecke was regurgitating ideas expressed by Steven Lewis on this very topic. Richard Steinecke is a prominent Canadian lawyer who specializes in the world of professional regulation and who publishes *Grey Matters* (<http://www.sml-law.com/resources/newsletters-2/grey-areas/>). Steven Lewis is Professor of Health Policy at Simon Fraser. The value in arguing from authority may be questioned, but both of these people are well respected in their fields.

“One way to try and determine where we are heading is to look back at the changes we’ve already seen.”

Regulated professions are relatively young in the grand scheme of things. For example, the Law Society in the UK had its first statutory disciplinary board established in 1907, just over a hundred years ago. Yet, even in that short time frame, there have already been some significant changes. Looking again to the Law Society (UK), they were split into two groups in 2007 in order to separate their representative and regulatory functions. Major change has and will continue to happen to all professions.

Trying to forecast the future is always

“Opening up the door to a limited license for qualified individuals that have not taken a traditional educational path is one way to alleviate this potential future pressure.”

fraught with imperfections. However, if you do not know where you are going, then any road will get you there. One way to try and determine where we are heading is to look back at the changes we’ve already seen. To that end, consider the substantial changes that have occurred in the health professions.

The overlap of professions can provide some revealing situations surrounding the identity of each profession. Medical doctors and nurses have seen that overlap shift over the decades. For example, in the past, professional nurses could not take blood pressure, start an IV, or draw blood unless under a physician’s order. A nurse who performed these functions was deemed to be illegally practising medicine.

Today, not only are these routine procedures for nurses, but their role continues to expand. In many jurisdictions, certain types of nurses may now administer anesthesia or even prescribe drugs without the supervision of a doctor. Imagine telling a doctor 50 years ago that nurses would have these professional rights in the near future.

Meanwhile, hospital functions that were previously performed solely by the nursing profession are now being performed by other staff. In one way, the picture painted by these examples can be seen as a shift in responsibilities. Looked at in another way, they represent the changes resulting from specialization and an openness to non-traditional methods of showing competency.

Nurses that are now authorized to prescribe drugs have undergone training

and experience beyond the undergrad requirement for most nurses. Their level of schooling may not be the same as that of a medical doctor, but they have focused their education to one area of practice. They have proven competency in one area of practising medicine and have been granted a certificate to practice in that defined area.

The relationship between the medicine and nursing professions are indicative of the shift that we are likely to see in engineering. Some provinces have already implemented limited licenses. These licenses are granted to individuals that have proven competency in a way that is different from the traditional form. They may not have taken four years of post-secondary education specific to engineering, but they have demonstrated a combination of education, experience, and dedication to professionalism that ensures that they are competent in a specific area of practice.

Lately there have been many stories in the media about whether or not we are heading towards a problematic shortage of engineers. Although some writers claim that the current growth in engineers will be sufficient, many are concerned that the pressures of demand will soon exceed the supply. Opening up the door to a limited license for qualified individuals that have not taken a traditional educational path is one way to alleviate this potential future pressure.

As always, I welcome any questions that you may have with respect to professional practice or other regulatory issues. Email me at: mgregoire@apegm.mb.ca ☎

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