AN INDEPENDENT SUPPLEMENT FROM MEDIAPLANET TO THE NATIONAL POST

Sustainable energy
Discovering a safer future

Empowering girls
Their roles in engineering

MEDIA PLANET

September 2012

THE FUTURE OF ENGINEERING

Flip over to read about Sustainable Living!

3

CONTRIBUTIONS TO ENGINEERING YOU MAY NOT KNOW ABOUT

THE ACADEMIC POSSIBILITIES ARE INFINITE

Pushing towards a better future in sustainability and women in leadership.

CHALLENGES

Engineers are constantly inspiring changes that improve the quality of life for all, and in the process, they are helping to secure Canada's economic prosperity.

Discovering new possibilities in all facets of engineering

Engineering is essential to society's health, safety and well-being, as can be seen within the groundbreaking work engineers have been a part of in major sectors including healthcare, infrastructure, and technology.

Despite our invaluable contributions, engineering is not well understood. We need to spend more time explaining what engineering is and better communicate the excellent, innovative and important work we do that benefits Canadians each and every day.

The misconceptions about engineering

The stereotypes associated within the engineering profession are incredibly outdated. Engineering is about much more than math and science. It is more than cubicles and hard hats, buildings and bridges, although the latter does include some of the key areas that engineers work in.

A career in engineering means constant learning. Engineers are expected to keep current on the latest advancements in technology, materials, standards and practices through continuing professional development. The education and training required to become

Catherine Karakatsanis
President, Engineers Canada

an engineer provides countless challenging and rewarding opportunities for anyone who wants to make a difference in society, and one that everyone should strongly consider when choosing a profession.

Student engagement

The opportunity to make meaningful contributions to society is the primary element many of today's youth look for in a career choice. Engineers Canada and its 12 constituent associations, the provincial and territorial associations that regulate the practice of engineering, recognize the innovative ideas and creative new approaches students of all ages bring to the profession.

Engineers Canada is actively involved with the Canadian Federation of Engineering Students (CFES) and sponsors their annual Canadian Engineering Competition, which bring the best and brightest engineering students together to compete in various categories with the goal of recognizing those who will go on to become future leaders.

Women in engineering

Engineers Canada continues to work to ensure that our professional pool is as diverse, dynamic, and reflective of the Canadian society as possible. In particular, we have an action plan and are focusing on improving conditions to attract and retain women in the engineering workforce. We would like women to represent 30 percent of those applying for engineering licences by the year 2030.

The number of women getting into engineering in Canada has been on the decline, despite a decade of efforts to encourage more girls to think of technical careers. While the number of licensed engineers in Canada who are women has grown from 7 percent in 2000 to 10 percent in recent years, the number of women enrolled in engineering programs has dropped from 21 percent in 2001 to just under 18 percent in 2010.

While we have already done much to improve these numbers, we need to do more. Through education and demonstration, we have the ability to encourage and motivate many, including women, towards a successful and rewarding career as an engineer.

Sustainable engineering and infrastructure

Engineers use creativity, teamwork, and leadership skills to provide solutions to Canada's needs and contribute to our nation's economic prosperity. Often we are leaders in finding new ways to do things better, with less negative impact on the environment. We employ sustainable approaches to all aspects of our work, applying engineering principles to improve air, water, and land resources. These principles are what allow us to carefully consider and implement conditions that affect safety and longevity as we adapt existing and future public infrastructure to a changing climate.

Everything engineers do is for the greater good. We contribute to creating better communities, a strong future profession, and a more sustainable Canada. Engineering truly makes a world of difference.

CATHERINE KARAKATSANIS
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Raising engineering to a whole new level

Sustainable energy technologies are clean sources that have a much lower environmental impact than conventional energy technologies.

They can be easily integrated into new and existing buildings while providing a number of significant benefits to building owners, including a reduction of both operating and capital costs, increase in asset value, lower environmental impact, and demonstrating corporate social responsibility.

Advancing infrastructure

The Metrolinx GO Oakville Parking Structure (pictured above) is a new six-level, open air parking structure accommodating 1,396 parking spaces. The new facility has a car counting system that enables customers to predetermine available parking spaces on each level.

The building is currently on its final stages of construction, with an anticipated completion this fall. With sustainability being a Metrolinx-initiated vision and an integrated design process lead by EllisDon, the project included several non-traditional design approaches towards parking structures. To demonstrate the commitment, a design basis energy model was generated early in the design stage to achieve higher building energy efficiency.

You can't always feel sustainability

Though pedestrians may stroll by unaware, a solar photovoltaic array located on the rooftop can offset the building's energy consumption by up to 60 percent. The facility also includes high efficiency LEED lighting system complemented by a lighting control system which allows for after hours reduction in lower traffic areas as well as sensors that dim perimeter fixtures when sufficient daylighting is available.

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Solar Photovoltaic Array located on the roof of the Metrolinx Oakville Multi-Level Parking Structure PHOTO: ELLIS DON

WE RECOMMEND

Canada's academic sector
Discovering the importance of this sector for our future engineers
PAGE 6

"The next generation must aim to be well-rounded people, not just engineers."

MEDIA PLANET

REPORT TITLE
3RD EDITION, SEPTEMBER 2012

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Distributed within:
National Post, SEPTEMBER 2012
This section was created by Mediaplanet and did not involve the National Post or its Editorial Departments.

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HOW TO PUT YOUR MONEY WHERE YOUR VALUE IS

Gervais Soucy
Chairman, Investment Monitoring Committee

The notion of responsibility is vital to the engineering profession. That's why many engineers, when it comes to investing, look for vehicles that allow them to align their investments with their professional values.

Influencing companies

Ethical funds, which exclude certain types of companies, are the best-known way to exert this degree of influence. Gervais Soucy, Eng., Ph.D., would like more and more of his colleagues to also consider actively investing responsibly. Mr. Soucy is the Chairman of the Investment Monitoring Committee at Gestion FÉRIQUE, a mutual fund company launched in 1974 by the Quebec Order of Engineers.

"Applying entry filters," he says, "is a good way to practice responsible investment but it is a rather passive method. With these types of funds, it is preferred to use the full weight of our assets invested in equity funds to actively influence our portfolio companies."

Policy: A force for change

To use this leverage, various policies are set and established for those in need. "By voting for or against certain resolutions at shareholder meetings, we, together with other major investors, weave environmental, social responsibility and good governance (ESG) principles into the fabric of organizations," Mr. Soucy explains.

Responsible investment is not the only financial health benefit for engineers. These types of not-for-profit corporations provide investors with high-quality funds, competitive returns and some of the industry's lowest fees. "We like to think we are well engineered," adds Gervais Soucy.

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INSIGHT

Educating our future leaders on diversity in engineering

INCREASED LEADERSHIP PROGRAMS HAVE ALLOWED WOMEN TO MAKE UP ALMOST 1/3 OF THE WORKERS IN THE INDUSTRY

In an increasingly globalized industry, the benefits of diversity on technical teams and the ability to work effectively across gender and cultural lines are very clear.

In 1996 the Natural Sciences and Engineering Research Council of Canada established the Chairs for Women in Science and Engineering (CWSE) program that funds five regional chairs at Canadian universities across the country. The program requires equal partner funding, usually from industry. Now entering its eighteenth year, the program showcases initiatives put forth by the current and recent chairholders that are starting to expand beyond recruitment and awareness activities for young and pre-university girls to leadership development for the many women already practicing science and engineering professions.

Leading by example

Many industry and government organizations have realized the benefits of a diverse workforce, in particular in contributing to innovation and efficient teamwork practices, and they are searching for ways to develop women's talents and to encourage women to take on leadership roles. The aircraft engine manufacturer Pratt & Whitney Canada, for example, initiated a Women's Leadership Forum in 2007 that has provided on-going mentoring, networking and leadership development activities for hundreds of female employees.

Catherine Mavriplis, Ph.D., P.E., NSERC
Associate Professor, Mechanical Engineering, University of Ottawa

The success and enthusiasm for this program led the firm to support the Ontario CWSE Chair that has organized practical workshops to help reap the benefits of cultural diversity in technical professions for managers, male and female, at their Mississauga plant. Other companies have developed diversity initiatives that address flexibility, mentoring for leadership and personal or social connections to work, such as WorleyParsons in the oil and gas sector.

The success of future leaders

In the last two years, the Canadian Centre for Women in Science, Engineering, Trades and Technology (WINSETT) has offered over a dozen leadership workshops across the country for women engineers seven to ten years post-graduation.

In all of these activities, women report feeling empowered simply by being given the opportunity to discuss differences in styles of communication, in their approach to teamwork, in leadership styles, and to explore their own strengths and areas to work on.

The cultural diversity sessions at Pratt & Whitney Canada were also highly appreciated by the participating men, of Canadian and foreign origin alike.

Benefits of diversity

In an increasingly globalized industry, the benefits of diversity on technical teams and the ability to work effectively across gender and cultural lines are very clear.

Pratt & Whitney Canada owns a manufacturing plant in Poland and employs another 1600 people in various locations outside of Canada, while WorleyParsons employs over 40,000 at 163 offices in 41 different countries.

Seeking the future

While the CWSE Chairs have expanded their programs to professional women scientists and engineers, they continue to develop many activities for recruitment to university programs. However, supporting the success of women in the workplace will also provide more role models for young girls who will be able to picture themselves in similar roles.

CATHERINE MAVRIPLIS
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QUESTION & ANSWER

Susan Murphy
President, Canadian Federation of University Women

■ What importance do women in leadership have on the younger generation females who are looking to make a difference?

Today's female leaders can be mentors and role models, but broader shifts in organizational cultures still need to take place to create more inclusive environments for women to advance. Despite the desire of many women to advance into leadership positions, there are still many barriers, including the lack of role models and sponsors in upper management to create opportunities.

■ What benefits and opportunities does working in a trade have on women?

Many of the trades are considered to be non-traditional occupations for women, as they represent less than 30 percent of all workers. Often these jobs pay more and provide better benefits than jobs in more traditionally female dominated occupations, seen in the service, clerical, non-profit and administrative industries. Women still earn on average 71 percent of what men make in Canada, however, it is imperative that women entering these non-traditional occupations are compensated at the same rate as men. Bringing women into the industry will also help to combat the labour shortages.

■ What do women in leadership roles look like?

According to Statistic Canada in 2009, only 31.6 percent of senior managerial positions across sectors were held by women. In the corporate sector, only 6 percent of Canada's largest 500 corporations are led by women and women occupy only 14 percent of board positions.

■ Are women moving closer in the trades industries to breaking that glass ceiling?

Although there have been some notable gains in women's share of employment as physical science professionals, and in technical occupations in architecture, drafting, surveying and mapping, as well as managers in engineering, architecture, science and information systems, women still make up the minority of those employed in these fields.

According to a 2010 report by Natural Science and Engineering Research Council entitled "Women in Science and Engineering in Canada" the problem starts early on in schools, but lack of leadership and policy development within industry itself has also proven to be a major factor in failing to attract and retain women in greater numbers. According to NSERC, a lack of female role models combined with a "chilly" industry climate towards gender diversity has provided little incentive for women to pursue careers in engineering.

Let's talk solutions

A national strategy is needed to address the long-standing underrepresentation of women in skilled trades and other non-traditional occupations. The Government of Canada, provincial/territorial levels of government, industry, business and labour stakeholders must work cooperatively to develop and implement this strategy. This is not simply a women's issue; it is an issue for the future of the Canadian economy.

SUSAN MURPHY
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BRIDGING THE ACADEMIC AND PRIVATE SECTORS

INSIGHT

Undergraduate engineering students have paid it forward — over 10 million times!

The Waterloo Engineering Endowment Foundation, marked and passed its $10-million milestone in 2011. WEEF was launched in 1990 by engineering students John Vellinga and Avi Belinsky to help fund student projects and support student teams above and beyond what was provided by the university.

WEEF director Brock Kopp, says the fund has provided students with a sense of ownership and pride in Waterloo Engineering. The third-year mechatronics engineering student is shown here in the WEEF-supported student machine shop with Cailin Hillier, left, and Sydney Bateman.

SOURCE: UNIVERSITY OF WATERLOO
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INSPIRATION

QUESTION AND ANSWER

Pearl Sullivan
Dean, Faculty of Engineering, University of Waterloo

What opportunities and benefits do the Engineering fields and Industries have to offer Canada and our future Engineers for the next 20 years?

The opportunities and benefits for Canada and future engineers are virtually endless! The engineering profession has never been more important — business, academic and government leaders recognize the profession as a key driver of innovation, entrepreneurial activity, economic performance, and social progress. Waterloo Engineering's programs are designed to successfully develop a new generation of Canadian engineers with the skill sets, ethical grounding, ingenuity and confidence to create innovative solutions that will make a difference in Canada and around the world.

As a leader of the Engineering Industry, how important is green and sustainable building to Canada?

In Canada, green and sustainable building is vital to the survival of our country. Reducing the energy use and improving the sustainability of buildings is one of the lowest cost means of reducing emissions, lowering dependency on energy use, and lowering operating costs. Studies have repeatedly shown that it saves money to improve their efficiency. As buildings create most of the environment in which we spend most of their lives, improving buildings is a key to improving Canadians lives. As a leader in building science and technology it is critical to maintain our leadership in this area as the world's focus continues to turn toward sustainability.

What has been your greatest contribution to engineering and infrastructure and how has it impacted the industry and community?

Waterloo Engineering's major contributions to Engineering and Infrastructure include the work we've done in areas such as renewable energy technology, smarter demand management, economic modelling, and carbon capture and storage. The University of Waterloo's Energy Research Centre provides a focal point for engineering's energy research groups, solar thermal research laboratory, energy and pollution modelling, and fuel cell research and development labs. We're solving immediate problems that affect industry and our communities and we're leading the way in shaping the future of sustainable and cost-effective energy systems.

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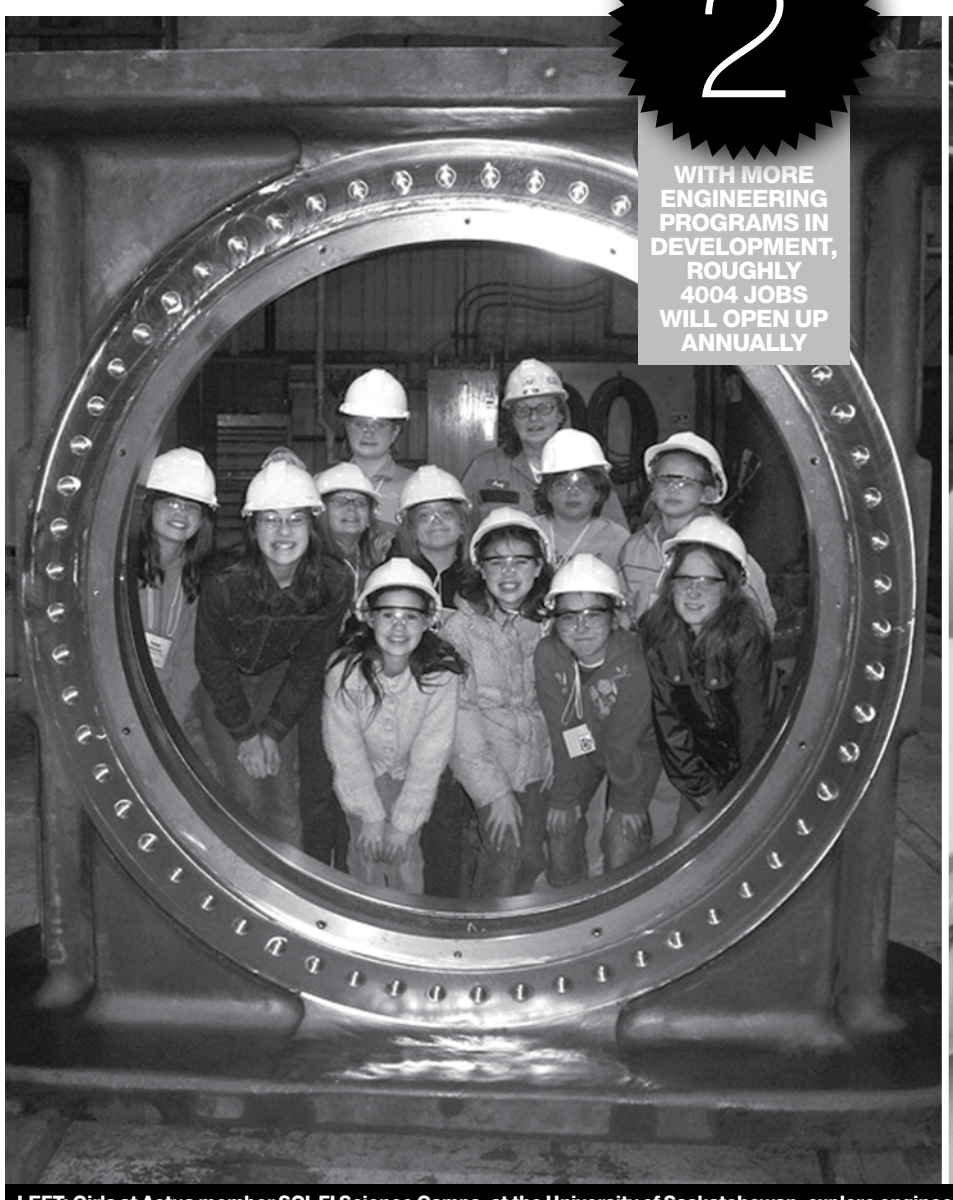

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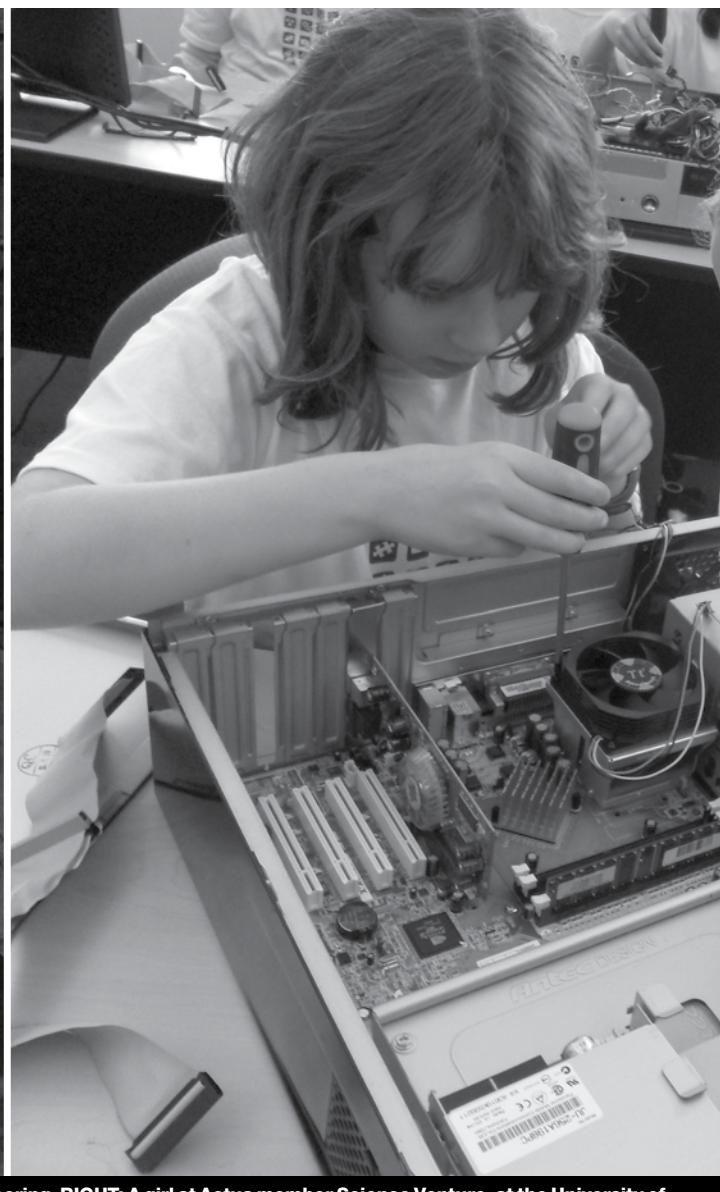
WITH MORE ENGINEERING PROGRAMS IN DEVELOPMENT, ROUGHLY 4004 JOBS WILL OPEN UP ANNUALLY



LEFT: Girls at Actua member SCI-FI Science Camps, at the University of Saskatchewan, explore engineering. RIGHT: A girl at Actua member Science Venture, at the University of Victoria, dissects computers. PHOTO: ACTUA

Empowering women and girls in the workforce

Who are we?

Actua is a national charity that inspires youth to achieve their potential through their engagement in dynamic science, engineering and technology education outreach programming. We support a network of 33 member organizations located at universities and colleges that deliver school workshops, camps, clubs, and community outreach events. We also have an Outreach Team which reaches the country's most remote regions, including many of the hardest to reach communities in the Arctic. Together we engage over 225,000 youth per year in 500 communities reaching every province and territory.

We engage youth at an early age before they make decisions about future career options. Our approach goes beyond traditional hands-on science. We provide opportunities for youth to build skills and advance their knowledge of science concepts and encourage them to apply that knowledge creatively to solve problems. Ultimately we are helping to foster a new generation of innovative thinkers: young people who will apply their knowledge and know-how to make a valued contribution to Canada's economic growth.

Don't forget the girls

Unfortunately, women continue to be significantly underrepresented in science, engineering and technology, comprising less than 25 percent of the workforce in many of these fields. We launched our National Girls Program in 1999 when we noticed a steady decline in the number of girls participating in our co-ed camps. Our all-girl camps and clubs provide safe spaces where girls are free to experiment, design, explore and — most importantly — to make mistakes. These factors, combined with mentor events and field trips, allow girls to experience science and engineering from a variety of perspectives and imagine themselves in these fields in the future.

Girls often underestimate their abilities and assume they lack what it takes to excel in science and engineering. They think those subjects are reserved for "gifted," and often male, students. Given the right environment and positive role models, girls' attitudes change drastically. They are amazed and proud of how much they already know. Instead of being intimidated, they are eager to learn more.

Positive improvements

Over the years, we have seen increases in the number of women studying in some fields. Biology and medicine now have almost equal numbers of female students. We have not seen such improvements in engineering, physical sciences and computer sciences. We need to build on the positive momentum to further advance women's progress and leadership positions.

Let's change what's preventing growth

There are a number of factors at play — from still existing stereotypes still to societal ideas about gender roles. The most important issue is that young girls lack role models and positive early experiences. We address this by placing mentorship at the core of our programing. We invite inspiring female professionals such as neuroscientists, computer programmers, and civil engineers to share their work and personal stories. These meaningful connections inspire girls to imagine themselves in similar professions.

Actua campers unveil their robotic innovations. PHOTO: ACTUA

> "They are amazed and proud of how much they already know. Instead of being intimidated, they are eager to learn more."

Jennifer Flanagan
CEO, Actua

Help your daughters flourish

Parents play a large role in influencing their daughter's futures. It is incredibly important for us as an organization to inform parents and empower them to educate their young future leaders. By encouraging ongoing participation in mentor programs, as well as through our own program here at Actua, we hope to help parents guide their daughters in seeing the link between their interests and science.

JENNIFER FLANAGAN
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Celebrating 100 years of success

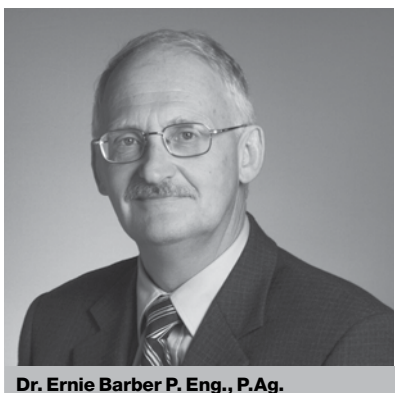
From September 20 – 23 2012, the University of Saskatchewan (U of S) college of engineering's 100 year anniversary was celebrated.

"Our reunion was about showcasing our alumni, and thanking them for engaging with and supporting the college," said Ernie Barber, Dean of the College of Engineering. The centennial reunion was kicked off with a Research Day, which showcased research from more than 30 faculty, graduate students and industry partners, among other events over the weekend.

Barber explains, "Innovation is at the core of what engineers do. The work of engineering impacts the world around us and is more interdisciplinary than ever before." Given Saskatchewan's strong economic performance and university reputation, U of S engineering graduate students have the opportunity to work hands on with the industry on cutting-edge research and are well-prepared to work in a global environment.

Building upon the past

A highlight of the centennial weekend was in celebration of one of the college's earliest achievements, the design and building of Saskatoon's unique Broadway Bridge, spearheaded by Chalmers J. MacKenzie, first dean of the college. This was a project that was intended to help the unemployed during the Great Depression. Alumni and centennial attendees gathered at the top of the Broadway Bridge for a plaque unveiling and commemoration of C.J. MacKenzie.



Dr. Ernie Barber P. Eng., P.Ag.
Interim Dean, College of Engineering, University of Saskatchewan

"We wanted this weekend to be a celebration of engineering, and our graduates and it was tremendous to have so many alumni return to campus. They have played an important role in shaping Saskatchewan and have made significant contributions the social and economic development in this province and around the world," states Barber.

SOURCE: UNIVERSITY OF SASKATCHEWAN
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NEWS

3

SUSTAINABILITY WILL ENGINEER YOUR FUTURE

PHOTO: CSCE

Sustainable infrastructure: Going green isn't enough

Canadian households will be on the hook for nearly $14,000 over the coming years because of a need to replace existing infrastructure.

The current Building Canada Plan expires in 2014 and this is a great opportunity for Canadians to direct the conversation towards sustainable infrastructure, not just focus on green issues.

"We need to have bigger conversations than those on how we can cut down on the use of water, for example. We need to look beyond LEED (Leadership in Energy and Environmental Design) while recognising it still has a place," emphasizes Nick Larson, a Project Manager and Associate at R.V. Anderson Associates Limited in Toronto.

"We need to look beyond LEED while recognising it still has a place."

Nick Larsen. MEPP, P.Eng.,
Project Manager, Associate,
R.V. Anderson Associates Limited

Shocking figures

Larson was involved in putting together Canada's first report card on the state and performance of infrastructure in 123 Canadian municipalities. This report was released by the Federation of Canadian Municipalities (FCM) and three industry partner organizations: the Canadian Construction Association, the Canadian Public Works Association and the Canadian Civil Engineering Society.

The report card, based on 2009-2010 data, provides an assessment of the condition of municipal infrastructure and the state of infrastructure management in Canada. It evaluates the state of municipal drinking-water systems, wastewater and stormwater networks, and roads.

The findings at a glance: stormwater systems are found to be "very good, fit for the future"; drinking water and wastewater systems are "good, adequate for now," while (and no surprise here) roads are "fair, require attention".

With stormwater systems, 23.4 percent of stormwater pipes rank fair or below their appropriate standards. The replacement cost is calculated at $15.8 billion or $1,270 per household in Canada. This is just the beginning. About 15.4 percent of drinking water pipes rank fair or below, with replacement cost pegged at $25.9 billion or $2,082 per household in Canada.

Close to a third of wastewater pipes are ranked "fair or below" and replacement cost is estimated at $39 billion or $3,136 per household in Canada. The real whopper is the state of municipal roads. More than half (52.6 percent) of municipal roads rank fair or below. Replacement costs are $91.1 billion or $7,325 per household in Canada.

Looking ahead

The figures are shocking but Larson is hopeful about grassroots involvement.

"Sustainable infrastructure calls for a look at the durability and resilience of infrastructure. I firmly believe it will happen from the bottom up," he says.

DAMIEN LYNCH
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QUESTION & ANSWER

Nicolas Blanchet
President, Canadian Federation of Engineering Students

What opportunities and benefits does the Engineering Industry have to offer our academic communities?

We have all heard the stereotype that portrays engineers as narrowly focused and the next generation must aim to be well-rounded people, not just engineers. As the role of the engineering profession is to support and improve the community using their minds & products, it is up to them and their respective industries to make a difference. Industries have to invest in these students by offering them internships and work opportunities, as well as personal growth opportunities all along their careers.

As a leader of the Engineering Industry, how important is green and sustainable building to Canada?

As Canada has a fairly small population, the second largest land mass, and an abundance of natural resources; green & sustainable building is extremely important. The challenge is to create and maintain a sustainable infrastructure for an enormous territory. Since the demand on our resources will only increase, we must make sure we minimize the impact this will have on our environment. The engineering industry has the potential, and must help Canada in becoming a benchmark.

What has been your greatest contribution to engineering and infrastructure and how has it impacted the industry and community?

My biggest addition to the engineering students' community, in my opinion, will be the launch of the first International Engineering Competition that the Canadian Federation of Engineering Students will organize. The event will happen in Calgary, Alberta in September 2013. Our annual competitions, and especially the upcoming international one, showcase the excellence of engineering students both to industry professionals and to other students, and encourages other students to push themselves and reach new heights.

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