

Dean's Report



ROBERT SEVALRUD

Two hundred and thirty-four McGill engineering students worked as interns across Canada and abroad this past year to gain experience, confidence and practical industry skills. The McGill Engineering Student Centre recently organized a photography contest to encourage interns to share their experiences. This first-prize photo was taken by Civil Engineering undergrad Robert Sevalrud, who worked for PCL Construction Management in Calgary as a junior field engineer. The picture shows one of two office towers that Sevalrud helped to build, reflected in the windows of an adjacent structure. Sevalrud, by the way, is also an SNC-Lavalin Scholarship winner. Other internship, student exchange and study abroad photos can be viewed at <http://mecc.mcgill.ca/students/PhotoContest2008.php>

Major gift from the Vadasz Family Foundation

Doctoral fellowships will spur research and innovation

McGill Engineering has taken a major leap forward thanks to a transformative, \$8-million-plus gift from Les Vadasz, BEng'61, DSc'07, and his wife, Judy Vadasz.

The Vadasz Family Foundation's endowment will provide doctoral fellowships in perpetuity for at least 15 outstanding students annually. Faculty of Engineering Dean Christophe Pierre says, "The Vadasz endowment will significantly enhance our Faculty's ability to attract and retain the very best emerging researchers and innovators. That, in turn, will have a profound effect on McGill Engineering's long-term ability to deliver graduate education of the highest quality."

"These gifted doctoral students will not only have an impact on teaching and research at the Faculty of Engineering," Pierre adds, "but, ultimately, they will advance Canada's leadership in technology and innovation. I cannot overstate the significance of Les and Judy's support."

The couple says that their gift "is a small way for us to say thanks and to give back to



Les Vadasz

a great institution that had such a pivotal impact on our lives."

Les Vadasz arrived in Montreal in 1957 as an immigrant from Hungary. Even though he had no resources and was learning a new language from

scratch, he says that McGill provided the opportunity to get an engineering education. "Whatever else followed in a successful career that spanned almost 40 years," he says, "was built on those four years at McGill."

Part of the founding management team of Intel Corporation, Les Vadasz is recognized as an innovator and strategic leader. He led the engineering initiatives that created the memory and microprocessor products that form the foundation of today's computer industry. Later, Vadasz was President of Intel Capital, which has become the largest corporate-strategic venture program among high-tech companies,

supporting hundreds of start-up businesses.

The gift also represents "our appreciation and trust" for what McGill's Faculty of Engineering is doing to move forward, Les and Judy say. "In the course of the last couple of years, we have seen a purpose and a momentum toward improving McGill's ability to get the best and brightest students and faculty, and to provide them with the means to excel. Those we met impressed us as professionals, eager to achieve and excel."

"In fact," Judy continues, "the more we learn about McGill, the more impressed we are. We feel great trust in the way our gift will be used."

The couple's donation to McGill Engineering is the largest gift to date to Campaign McGill from outside of Canada.

WHAT'S INSIDE

Dean's Message	p 2
Industry Partnerships	p 3
Conserving Resources	p 5
A Surprise Gift	p 6



Dean's Message



The economic downturn is affecting universities worldwide and McGill is no exception. Faculties such as ours have to make hard choices to ensure that we maintain high standards while helping McGill meet its commitment of a zero deficit by 2011.

In recent remarks to the University Senate, Principal and Vice-Chancellor Heather Munroe-Blum said that expenditures at McGill will be cut to meet reduced revenues, but excellence will be maintained. Her message was clear. Despite a drop of almost 20 per cent in the University's endowment fund, the Faculty of Engineering, like other major units at McGill, must ensure the quality of its teaching and research.

In Engineering's case, the bar has been set high. The 2008 Times Higher Education-QS World University Rankings placed our Faculty 18th among the world's top engineering schools. Only one other Canadian engineering school joins us in the ranking's top 20.

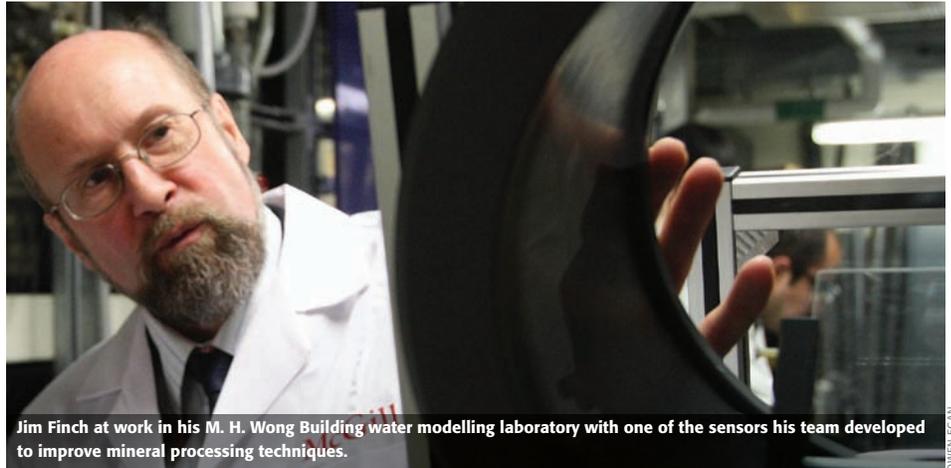
The accolade is due in large measure to the increased recognition we are receiving for the cutting-edge expertise of our professors, the superior talent of our students and the contributions our alumni make around the globe. Built over generations, this reputation for quality must be protected. We cannot allow the value of our product to be tarnished by the ebb and flow of the world's financial markets.

More than ever, our students rely on you, our trusted alumni, to provide the additional resources that McGill Engineering needs to offer the finest education possible.

I thank you for your generosity to date, and I urge you to do your utmost to help McGill's Faculty of Engineering weather the current financial storm.

Christophe Pierre
Faculty of Engineering

Faculty of Engineering researchers honoured as leaders in global mining industry



Jim Finch at work in his M. H. Wong Building water modelling laboratory with one of the sensors his team developed to improve mineral processing techniques.

The Natural Sciences and Engineering Research Council of Canada has presented its 2008 Leo Derix Synergy Award to Mining and Materials Engineering Department professor Jim Finch, MSc'71, PhD'73, and his McGill Mineral Processing Group.

NSERC created the Synergy Awards for Innovation in 1995 to recognize R&D partnerships between universities and industry. The prizes honour Canadian ingenuity and highlight the most outstanding achievements each year in university-industry collaboration.

The team that Professor Finch leads has worked with national and international mining

corporations for two decades. His research group pioneered a series of innovations that have significantly improved the efficiency of mining and processing operations by perfecting methods to recover base metals from ore deposits.

Specifically, Finch's team made breakthroughs in flotation chemistry and the physics of gas dispersion as they relate to flotation cells – the chemical reactors that permit the separation and collection of target minerals from finely milled ore particles.

The NSERC award includes a \$200,000 research grant.

Advancing Material Design and Process Engineering

First Hatch Faculty Fellows Awarded

Mining and Materials Engineering Department professors George Demopoulos, MSc'78, PhD'82, In-Ho Jung and Showan Nazhat have been selected as McGill Engineering's first Hatch Faculty Fellows. The prestigious award was established by alumnus Gerald G. Hatch, BEng'44, DSc'90, to promote research, academic achievement and leadership potential, most notably in the discipline of process materials engineering.

The award can be given to rising stars or professors already recognized for the exceptional quality of their work. Either way, the Hatch funding is designed to encourage researchers to apply fundamental knowledge to projects of wide socio-economic scope in order to enhance the work of current and future engineers.

Faculty of Engineering Dean Christophe

Pierre says, "The Hatch awards will enable our professors – together with their graduate students and industry partners – to initiate innovative and bold avenues of research and, ultimately, produce breakthroughs."



George Demopoulos

In-Ho Jung

Showan Nazhat

"By investing in these academic leaders and giving them the means to pursue their ideas," he continues, "we expect they will play a transformative role in the future of material design and process engineering."

Aerospace engineering links Mo

In March 2009, Bombardier announced a \$2-billion contract with Lufthansa to deliver 30 C-Series jets by 2013 – a deal that propels the Montreal-based aircraft manufacturer into the commercial airliner market currently dominated by Boeing and Airbus. It also consolidates Montreal's status as an international aerospace hot-house, behind only Seattle and Toulouse, the homes of those other two industry behemoths.

Bombardier's success reaffirms that Montreal's aerospace industry, even in tough economic times marked by lost jobs and reduced sales, is well placed to continue its growth and innovation. In 2008, Quebec's aerospace industry accounted for 60 per cent of Canadian aerospace operations. It numbered 236 companies, with a total of 42,400 employees and \$12.3-billion in sales, almost entirely within the Montreal region. Quebec is also home to 70 per cent of Canadian aerospace R&D.

Much of this research involves collaboration with McGill's Faculty of Engineering, which has at least 25 professors and their research teams, across all departments, involved in collaborations with companies like Pratt & Whitney Canada, Rolls Royce Canada, Bombardier, Bell Helicopter, CMC Electronics, and CAE, as well as numerous smaller companies and the Canadian Space Agency, which is also based in the region.

"So clearly, exchange with local industry is a major component of our aerospace research effort," says Electrical and Computer Engineering Department professor Andrew Kirk, our Faculty's Associate Dean, Research and Graduate Education and Director of the McGill Institute for Advanced Materials.

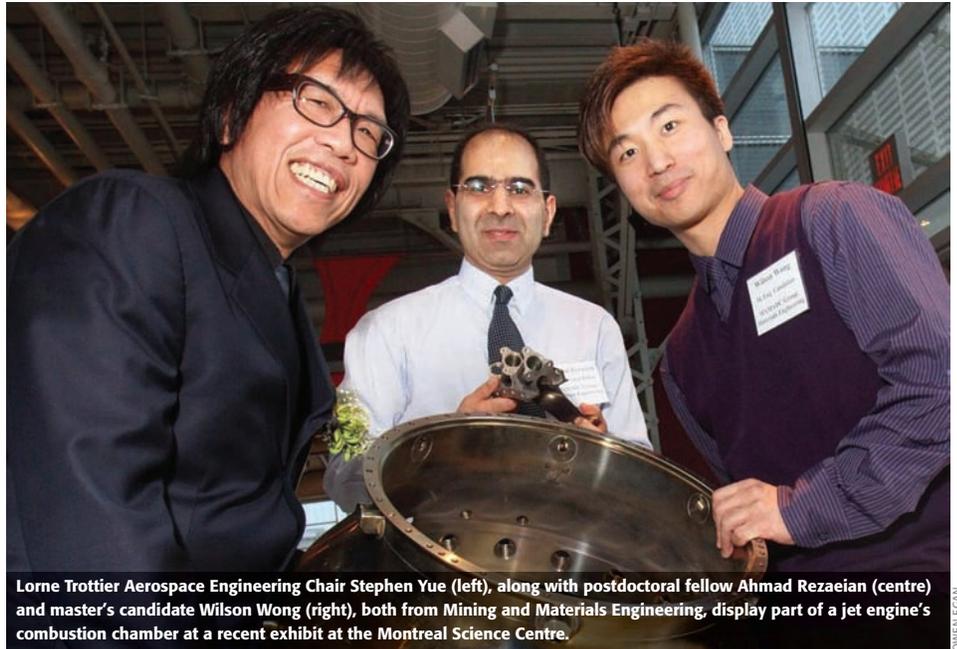
Added to this, Kirk says a body called CRIAQ (the Consortium for Research and Innovation in Aerospace in Quebec) is working with the National Research Council of Canada (NRC) to help create more opportunities for collaboration between business and universities.

Inaugural chair selected to promote research and education

A new factor driving interaction between business and universities is the Lorne Trottier Chair in Aerospace Engineering, which was established to promote research and education in that field.



Andrew Kirk



Lorne Trottier Aerospace Engineering Chair Stephen Yue (left), along with postdoctoral fellow Ahmad Rezaeian (centre) and master's candidate Wilson Wong (right), both from Mining and Materials Engineering, display part of a jet engine's combustion chamber at a recent exhibit at the Montreal Science Centre.

OWEN EGAN

"The chair, funded by a generous gift from Matrox Electronic Systems founder and CEO Lorne Trottier, BEng'70, MEng'73, DSc'06, will be critical to our aerospace effort," says Kirk, "because in addition to being a world-class researcher, the chair will serve as our standard bearer in interacting with industry and the rest of the world."

This April, McGill Engineering revealed that standard bearer when Stephen Yue, Chair of the Department of Mining and Materials Engineering, was selected as the inaugural holder of the Lorne Trottier Chair in Aerospace Engineering.

"Clearly, one of my roles will be to provide a window into aerospace activities at McGill, to inform the outside world about what we are doing. One way to achieve this is to establish a centre of aerospace research, which would help forge even closer ties between McGill and the local community."

In addition to these "ambassadorial responsibilities," the chair will also support some of Yue and his colleagues' existing activities, notably their Natural Sciences and Engineering Research Council of Canada-supported research on cold spray manufacturing processes (See summer 2008 edition of the *Dean's Report*), a collaboration with Pratt & Whitney Canada. Their objective is to provide an efficient and flexible alternative to traditional casting and machining.

Working at the McGill Aerospace Materials and Alloys Design Centre (MAMADC), Yue and fellow Mining and Materials Engineering Department professors Richard Chromik,

Mathieu Brochu, PhD'04, and Jerzy Szipunar – in conjunction with the thermal spray team headed by Jean-Gabriel Legoux at the Industrial Materials Institute in Boucherville, and supported by their teams of graduate students – have been approaching cold spray manufacturing from a number of perspectives, and the group is enthusiastic about making Montreal a global centre for cold spray R&D.

"I believe we will have the best facility on the planet," says Yue, adding, "Because we are creating new materials and processes, we will be helping to establish a technical work force that will attract more aerospace activity and new enterprises."

Bombardier's success reaffirms that Montreal's aerospace industry, even in tough economic times marked by lost jobs and reduced sales, is well placed to continue its growth and innovation.

Tools to track up to 100,000 airline parts

Constructing an airplane is a complex process. Say Bombardier requires 100,000 parts to build an airliner: each part, and all its associated information, must be tracked and managed. The process involves hundreds of people and dozens of companies, all using different design and information systems and all scattered across time zones and cultures.

"Designing and building the aircraft becomes a formidable exercise in terms of exchanging information and confirming specifications," says Mechanical Engineering Department professor Vince Thomson, "so we're developing tools that will help companies to communicate effectively with their partners."

This hefty collaborative undertaking involves creating the means to track components and all their associated information through their production life cycles, and includes Bombardier, Pratt & Whitney Canada, CAE, CMC Electronics and Rolls Royce, as well as researchers from McGill, Concordia University, École Polytechnique, École de technologie supérieure and Université de Sherbrooke.

Transforming our understanding of the critically important de-icing process

Among McGill Engineering's other top researchers, one of the most prominent is Mechanical Engineering Department professor



Wagdi Habashi

Wagdi Habashi, BEng'67, MEng'70, Director of the Computational Fluid Dynamics (CFD) Laboratory and holder of the NSERC-J. Armand Bombardier Industrial Research Chair (also supported by CAE and Bell Helicopter).

"We do novel and fundamental research, but all of it has industry applications," Habashi says.

His CFD modelling of in-flight icing has transformed our understanding of this critical process. "Airport crews can de-ice the plane all they want on the ground, but when it is flying through clouds, ice will form on it – and ice is extremely treacherous. Sometimes even small traces in the wrong places will make an airplane lose aerodynamic efficiency," he explains.

While conventional CFD models divide the airplane into various sections to understand



Lorne Trotter

localized icing, Habashi's group can model the entire aircraft, a task that demands tremendous computing power, but which also enables researchers to understand in-flight icing as a complete system.

His code can also be used to replicate the effects of ice within the aircraft engine or even on helicopters, and can produce data for flight simulators that are used to train pilots.

Habashi anticipates developing the technology so that a computer program running in the cockpit could inform pilots of icing effects on the plane as it flies.

Measuring the collision impact of high-speed space debris

Ice isn't the only thing that can cause trouble in flight. Last February, two communication satellites, one American and one Russian, collided 784 kilometres above Siberia, adding more space debris to the flotsam and jetsam already orbiting the Earth.

Larger pieces of debris can be followed with radar, so most collisions can be avoided, says Mechanical Engineering Department professor Andrew Higgins, but smaller ones fly untracked through space and could cause irreparable damage if they were to strike a satellite or the International Space Station.

Little is known about these impacts because up to now laboratories have been unable to reproduce the speed at which collisions with space debris occur (as much as 15 km/sec).

Higgins and his group, working with Canadian Space Agency funding, are developing a hypervelocity launcher that could replicate collisions at speeds as high as 12 km/sec,

providing a testing capability available nowhere else in the world. Already local aerospace manufacturers have expressed interest in using the laboratory to test how new composite materials would sustain these high-speed impacts.

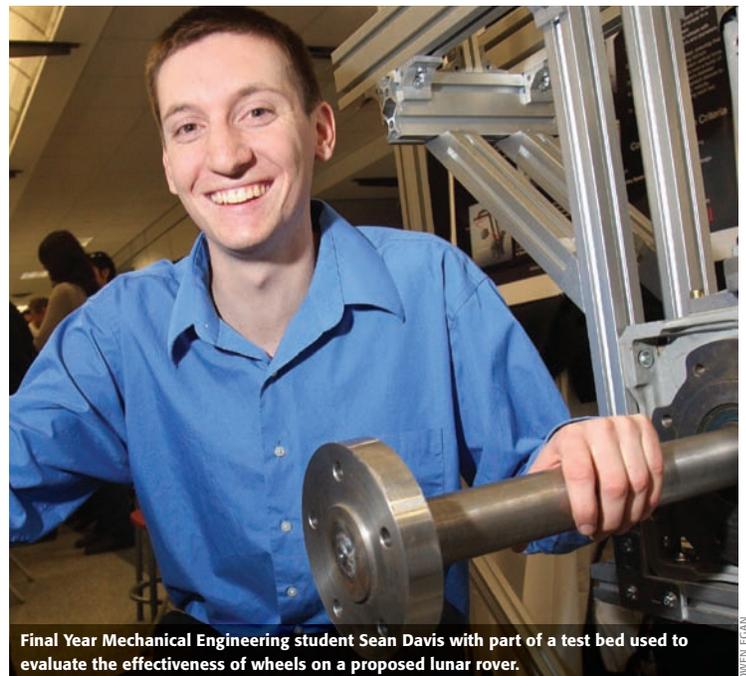
Integrating teaching and research to better serve the community

The results of McGill Engineering research may eventually travel as far as the lunar surface.

Mechanical Engineering Department professors Peter Radziszewski, Damiano Pasini and Vince Thomson, and Electrical and Computer Engineering Department professor David Lowther are working with fourth-year students in Radziszewski's capstone course to design a traction system for a proposed lunar rover.

The project is being developed for the Canadian Space Agency by a consortium headed by the Ottawa-based Neptec Design Group. The McGill students are helping to design the rover's metallic compliant wheels.

The project underscores an important aspect of the Faculty of Engineering's aerospace activity: the integration of teaching and



Final Year Mechanical Engineering student Sean Davis with part of a test bed used to evaluate the effectiveness of wheels on a proposed lunar rover.

OWEN EGAN

research. "The goal," says Yue, "is to generate top-quality aerospace personnel who will then grow local activity even more. It's all part of our efforts to develop the infrastructure that will enable us to build stronger links with the aerospace community."

Steady progress managing an irreplaceable resource

Water is life. But with ever-increasing urbanization and the demands of adapting to climate change, developing processes and technologies to manage water resources has become an imposing task.

"When I first began studying water management for sustainable development, I



Van-Thanh-Van Nguyen

was concerned with how best to obtain water for drinking, irrigation, and hydro power," says Van-Thanh-Van Nguyen, Acting Chair of the Department of Civil Engineering and Applied

Mechanics, Endowed Brace Professor Chair in Civil Engineering, and Director of the Brace Centre for Water Resources Management. "But now when I look at a cup of drinking water, I see its connection to the energy required to treat it. And I see how we need to develop integrated water management approaches that should consider energy consumption and urban water infrastructure design as well."

These contemporary questions of water resource management – many of them connected to public health, pollution remediation, urban water shortages and the impacts of climate change – occupy the Brace Centre's 23 faculty researchers and 100-plus graduate students, along with numerous postdoctoral fellows and undergraduates.

The Brace, a partnership between the Faculty of Engineering and the Faculty of Agricultural and Environmental Sciences, also includes researchers from the Faculty of Science.

"We need to be interdisciplinary to move forward," says Chemical Engineering Department professor Nathalie Tufenkji, BEng'00. As the Brace's Associate Director, she sees her role as "helping to bring people together to share knowledge."

A multifaceted approach

The Brace Centre's research embodies this knowledge-sharing. Nguyen, who is also Associate Director of McGill's Global Environmental and Climate Change Centre, has developed a comprehensive approach to determining which types of infrastructure best address regional climate change.

Take sewer system design, for example. Engineers must estimate a region's extreme rainfalls to design systems that will not flood. These estimates have been based up until now on historical records, but with climate change this approach no longer works.

Nguyen confronts the problem by drawing upon established global models that project climate change over the next century and incorporating their data into his own models to predict extreme rainfalls (and thus maximum sewer system flows) for specific regions.

Such focused impact assessment techniques can be applied to other issues – transportation and public health, for instance – that would also be affected by changing precipitation. The broad potential of Nguyen's multifaceted

approach has led to collaborations with researchers across the globe.

Other Brace researchers also have a global reach, notably Brace Founding Director and Dean of Agricultural and Environmental



Nathalie Tufenkji

Sciences, Chandra Madramootoo, BSc(AgrEng)'77, MSc'81, PhD'85, whose many projects include the Canadian International Development Agency-funded Caribbean Water Initiative, which is developing water management capacity in Grenada, Guyana and Jamaica.

Madramootoo is also collaborating with Tufenkji on a project she leads, learning about the surface properties – everything from size to surface charge – of disease-causing microbes, as these properties, along with water chemistry, contamination levels, and temperatures, influence how the microbes travel and survive in groundwater.

Cleaning toxic spills

Understanding how these factors interact means we can develop environment-specific approaches to govern such activities as the disposal of agricultural waste, a common source of these microbes.

Tufenkji is also collaborating with Civil Engineering Department professor Subhasis Ghoshal on his project to remediate groundwater contaminated by highly toxic organic solvents.

Studies show that iron nanoparticles can break down these toxic substances into their benign components. Unfortunately, when these nanoparticles are injected into the ground, they travel only a short distance before clumping together and sticking to the soil.

Ghoshal's team is investigating whether cellulose-based polymer coatings applied to these nanoparticles would enable them to travel through groundwater for much longer distances, making them feasible for cleaning large spills. If successful, this approach could be used to recuperate contaminated sites across North America and Europe, including one at Valcartier, Quebec.



Subhasis Ghoshal in his McConnell Building Environmental Engineering Laboratory.

Here are some of the ways that leadership gifts help students perform at their best:

- Gifts of **\$750** (Deans' Circle) can help students hone their skills at national and international design team competitions.
- Gifts of **\$1,500** (Principal's Circle) can be used to purchase computer software and subsidize professional development services to better prepare students for the job market.
- Gifts of **\$2,500** (Chancellor's Circle), or more, can be combined to help modernize study and work space, a major drawing card in attracting the best students to McGill.
- Gifts of **\$5,000** (Governors' Circle) can be used to purchase first-in-class laboratory and teaching equipment.
- Gifts of **\$25,000** (Founders' Circle) can help fund multi-year scholarships, thereby ensuring that top engineering students can study at McGill, regardless of their means.

Alumni make all the difference

Alumnus Roger Boudreault, BEng'60 (below left with Faculty of Engineering Dean Christophe Pierre), created quite a stir at last Fall's Engineering Dean's Homecoming Breakfast by walking up to the microphone, telling the room about the impact McGill has had on his life, and then turning over a \$25,000 cheque to Dean Pierre.



"McGill teaches all of us how to sail," Boudreault said at the time, "and we use that knowledge for the rest of our days to sail through life, in both good times and bad." Boudreault's Founders' Circle donation was his way of saying "thank you" to McGill Engineering.

Boudreault's surprise gift was one of about 3,000 Alma Mater Fund donations that loyal Faculty of Engineering alumni make each year to support programs, services and activities that benefit undergraduate and graduate students. Last year our alumni contributed \$876,000.

To meet this year's commitment to our students, McGill Engineering needs to raise \$1-million by the end of May. Any gift that you make between now and May 31 – no matter what the amount – will be greatly appreciated. Thank you.

When making a donation, **please designate Engineering**, or your Department or School. You can also make your donation online at www.alumni.mcgill.ca/online-giving

Matching Gifts

If you are an employee of a company with a matching gift program, your gift can do twice as much for Faculty of Engineering students. Simply ask your employer for a matching gift application form. These programs bring thousands of dollars in corporate matches to our Faculty and allow you to give more – for free.

Please direct comments, inquiries and address updates to:

Faculty of Engineering | Macdonald Engineering Building
Room 378 | 817 Sherbrooke Street West
Montreal, Quebec | H3A 2K6
Telephone 514-398-1371
engineering.alumni@mcgill.ca

Your contribution helps change the world.



Mark These Dates In Your 2009 Agenda

Spring Convocation	May 26
Toronto Leacock Luncheon	June 5
Dean's Homecoming Breakfast	Oct 16
Montreal Leacock Luncheon	Oct 16