



Dean's REPORT

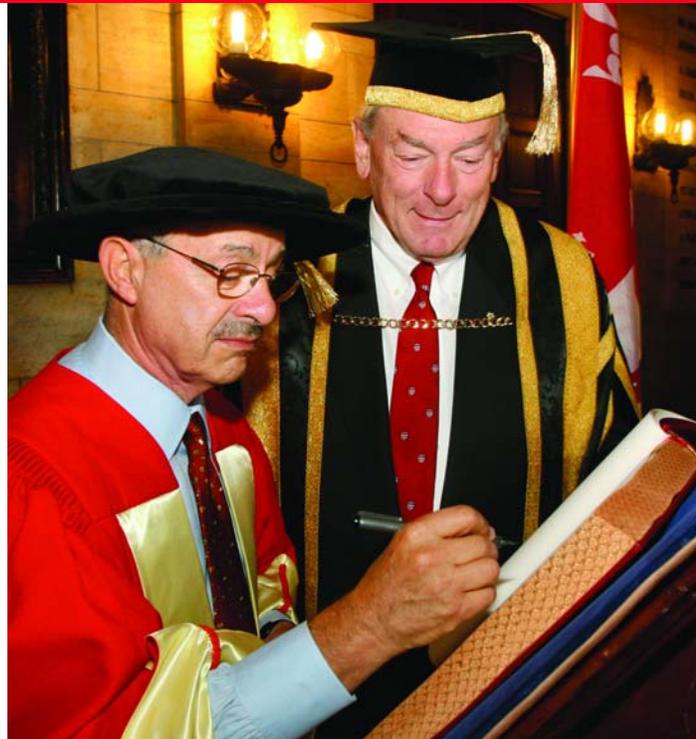
Dear Graduates and Friends,

The last issue of the *Dean's Report* described how the Faculty was growing, and this continues to be our big news. And our alumni are helping tremendously. Thanks to a remarkable gift of \$6-million by Lorne Trottier to endow the Lorne Trottier Chair in Aerospace Engineering, as well as several new doctoral fellowships, we will be taking that program to new heights. And this past September we welcomed 28 fellowship PhD students, thanks to our new financial aid program which has been generously supported with gifts from alumni like Les Vadasz and the late Lars Firing. We expect to add another 35 new fellows this September, and ultimately have plans to expand our funding packages to support 50 new fellows each year, although we know that this will take a sustained effort and plenty of help. The effort is necessary: our research activities rely heavily on our graduate students.

The Faculty is also being transformed by the next generation of researchers, who bring with them some exciting new approaches to working in biomedical technologies, nanotechnology, environmental engineering, urban design and a host of other important areas. This year, in the face of strong international competition, we hired 15 professors from some of the top institutions in the world; we are in the process of adding another 10 next year in order to reach a complement of 150, which constitutes a considerable increase in new professors. Our recruitment successes are a

testament to the environment we are cultivating in the Faculty and the University. For instance, this year, working with our friends in the Faculty of Science and at the McGill Institute for Advanced Materials, we were able to beat some very tough competition in hiring a young professor to fill a nanotechnology position that had been open for four years. We are proud that when the best candidate was available, we were able to bring him to McGill.

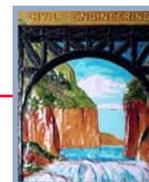
Good engineering research is also relevant research, so we are deepening our relations with industry. Companies like Bell Canada, Bombardier, Pratt & Whitney, Shell, Petro-Canada and BHP Billiton have been generous in support of our undergraduate and graduate students, as well as our research. Corporate support is also playing a prominent role in helping us operate the new McGill Engineering Student Centre. The spacious facility opened earlier this year, combining academic and career advising on the ground floor of the Frank Dawson Adams Building. We are also encouraging more industry participation at the various information and recruitment events held throughout the year, as well as in developing mentoring programs and internships.



Intel Corporation co-founder Les Vadasz, BEng'61 (left), and Chancellor Richard Pound, BCom'62, BCL'67, handle the formalities prior to Vadasz receiving an honorary degree at the May 29, 2007 Engineering Faculty convocation.

We are witnessing a huge increase in activity. Read on, and I'm sure you'll agree with me that these are exciting times for us at McGill Engineering.

Christophe Pierre
Dean, Faculty of Engineering



ENGINEERING
ALUMNI PRIDE



Trottier Fuels Aerospace to New Heights

Aerospace engineering at McGill will soon be flying higher than ever, thanks to Lorne Trottier, BEng'70, MEng'73, DSc'06. Trottier has donated \$12-million to McGill to establish the Lorne Trottier Chair in Aerospace Engineering in the Faculty of Engineering and the Lorne Trottier Chair in Astrophysics and Cosmology in the Faculty of Science. His gift will also fund generous endowments for graduate student support in both faculties.

Lorne Trottier is the epitome of the modern engineer. In an era in which social and corporate responsibility are popular vernacular, Trottier – the co-founder of Montreal-based high-tech video graphics company Matrox Electronic Systems – has matched his technical expertise with a willingness to invest his time and energy in caring for the community.

Trottier's connections to his alma mater run deep. He was awarded an honorary doctorate by McGill in the Spring of 2006 in recognition of his ongoing support of engineering education and for his contributions to industry. He has also served on McGill's Board of Governors, on its Finance Committee and on the Faculty of Engineering Advisory Board. The Lorne M. Trottier Building on McGill's upper campus, funded through his \$10-million investment of seven years ago, is a further example of the impact the entrepreneur has made on the University. To boot, Trottier's daughters, Claire and Sylvie, are McGill alumni.

Trottier's support for the new Chair in Aerospace Engineering stems, in part, from a lifelong infatuation with space-related sciences. Trottier recalls taking up remote-control model airplanes as a hobby while studying at McGill, and "I still like to bike out to the airport and watch the planes take off and land," he says. "I get a real charge out of that."

McGill's strengths in aerospace engineering and astrophysics provided the direct impetus for his latest gift; indeed, the University has three alumni – Julie Payette, BEng'86, DSc'03, Dave Williams, BSc'76, MDCM'83, MSC'83, and Robert Thirsk, MDCM'82, – who have gone on to become astronauts.

And within the Faculty of Engineering, at least 27 professors and their teams of graduate students and post-doctoral fellows are working on aerospace-related research. These research teams, distributed throughout the Departments of Mechanical,



Engineering Faculty Dean Christophe Pierre (left) acknowledges the remarkable contributions of alumnus Lorne Trottier during the ceremony announcing the Electrical Engineering grad's decision to provide McGill with \$12-million to fund Chairs and Fellowships in the faculties of Engineering and Science.

Electrical and Computer, and Mining, Metals and Materials Engineering, chiefly focus on four interdisciplinary areas: aerodynamics, space research, aerospace systems and aerospace materials.

The strength of McGill's contribution to aerospace education and research is critical to the health of local industry; according to Investissement Québec, Montreal is the world's second largest aerospace-industry employer in terms of jobs per capita, second only to Seattle. And Quebec industry leads the country in overall aerospace production, with sales of \$11.1-billion in 2005.

The Lorne Trottier Chair in Aerospace Engineering will be named following an international search for an incumbent.

Engineering Dean Christophe Pierre says the job criteria are clear. "The researcher who is appointed will be a leader who strengthens our partnerships with industry and leverages funding opportunities from government and private sources. This academic will help us to compete with increasing effectiveness for graduate students and postdoctoral fellows, building new linkages across departments, faculties and institutions to increase our critical mass, making exciting new breakthroughs possible."

In the Faculty of Science, physics professor Victoria Kaspi, BSc'89, an internationally renowned expert on neutron stars, holds the Lorne Trottier Chair in Astrophysics and Cosmology.

Transforming Graduate Research

Graduate students are central to a university's research mission. Professors direct and coordinate the work among their student and post-doctoral fellow research teams, but graduate students are the ones who actually write the computer codes, run the simulations, perform the experiments and build the prototypes.

Making sure that the brightest and the best enroll at McGill is not always easy, however. "Top-calibre graduate school applicants will apply to half a dozen or more of the leading universities around the world, so McGill needs to offer incentives to get the most talented students to choose us," says Engineering Faculty Dean Christophe Pierre.

"These gifted students are accomplished, independent researchers," Pierre adds. "They are creative, can take ownership of projects, write proposals and publications, attend conferences and become important parts of research centres."

McGill Engineering has always had remarkable graduate student talent, but up to now the Faculty lacked a formal recruitment plan with guaranteed funding to encourage the best students to enroll. An innovative new strategy introduced this past year is changing that. The fellowship program provides three years of guaranteed funding for the top applicants. For the first year, most money comes from gifts that alumni provide to the Faculty, but as the student progresses

through the doctoral program the onus for funding shifts to the supervising professor, who provides support from research grants.

The new strategy's impact has been immediate. There was a 20 per cent increase in applications for 2006-2007, and 28 fellowships were awarded. Ten of these students also received support through a generous gift of \$500,000 from Les Vadasz. They are known as "Vadasz Fellows."

In addition to efforts to secure adequate long-term funding for the recruitment program, the Faculty has been distributing publicity packages about student support to universities across Canada and the U.S. Next year the reach will extend overseas. And to encourage professors to support graduate students after they enroll, the Faculty is also offering incentives, such as discretionary funds, that can be allotted to faculty members whenever they graduate a doctoral student. These funds are then directed back into research projects and related activities, such as conferences, which also assist incoming students.

This issue of the *Dean's Report* profiles just a few of the Faculty's stellar graduate students. Some are beginning their research, others are nearing the end of their degree programs, but all are pursuing important and innovative work that helps make McGill Canada's top research university.

Lars Firing ENGINEERING A BETTER WORLD

Engineering research can dramatically improve life in regions where necessities are scarce: increasing and sustaining drinkable water supplies, helping provide fundamental resources like food and medicine, and delivering much-needed innovative engineering research applications to the developing world.

The late Lars Firing, BEng'50, DipMgmt'55, who passed away in February 2007, believed that "we are all going to be in trouble if we don't start addressing these problems right away." To help confront the challenges facing the poor in emerging nations, he donated \$1-million to establish the Lars and Alberta Firing Graduate Fellowships in Engineering, which will support students pursuing research in bioengineering (including biomedical engineering), environmental engineering, sustainable development of natural resources, alternative or sustainable forms of energy, transportation engineering and pharmaceutical chemical engineering. The first recipient will be named this September.

Firing was born in Montreal to Norwegian immigrants who arrived in Canada in 1923. His father, a self-taught chemist, chemical engineer and entrepreneur, was a persuasive role model, and Lars followed his lead, studying chemical engineering at McGill.

In 1973, he formed Firing Industries Ltd., which engineered and marketed chemical and food processing equipment for Canadian industry. Active in civic life, Lars Firing was also elected alderman and then mayor of Baie d'Urfé on the west island of Montreal.

In an interview not long before his death, Firing credited his university success to the support he received from John Phillips, the first Chair of the Department of Chemical Engineering, and to Phillips' successor Bill Gauvin, BEng'41, MEng'42, PhD'45. "McGill was very influential in helping me with my career, and so I wanted to give something back," he said. His late wife Alberta and their daughter Cheryl are also McGill alumni.



Alberta and Lars Firing have left a lasting legacy to improve life for the poor in developing countries.

Vadasz Fellows

Designing Tests to Test Designs

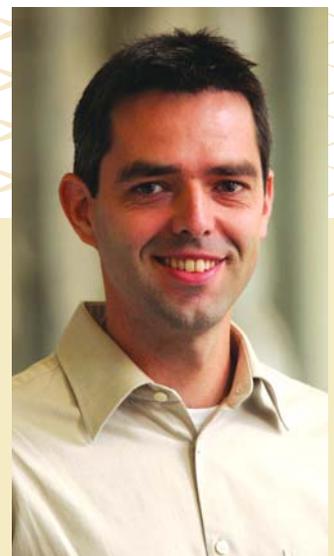
Testing computer chips can be a time-consuming and expensive process, but Sadok Aouini, BEng'04, Meng'06, who studies with professor Gordon Roberts in Electrical and Computer Engineering, is helping to change that. His objective is to find ways of making inexpensive yet high-quality tests for integrated circuits using tools such as a high-quality programmable analog Gaussian noise source. Aouini is so far along in the process that he has applied for a patent for his master's research. In addition to designing better tools to test chips, Aouini also coaches judo. "I've been interested in judo since I was six years old," he says.



Sadok Aouini

Optical Innovations

When Nortel was looking for new ways to design networks, the firm solicited help from researchers outside the world of network design, such as École de Technologie Supérieure (ETS) communications specialist François Gagnon, BEng'84, and his lead researcher, Benoit Châtelain. Châtelain was so successful in creating novel approaches to designing optical networks at ETS that his efforts resulted in three patent applications. The project eventually evolved into a collaboration between McGill, Nortel and ETS. Now a doctoral student in McGill's Department of Electrical and Computer Engineering, Châtelain works with professor David Plant on optical network architecture, using available technologies to develop new architectures to lower the cost and complexity of networks.



Benoit Châtelain



VADASZ
DOCTORAL
FELLOWSHIP
PROGRAM

AROUND AND ABOUT

Keeping alumni informed about who is doing what in McGill Engineering

Baja-SAE Team Co-Captain Cody Irwin, BEng'07 (left), and Associate Dean, Academic, Jim Clark share some thoughts about job opportunities for Engineering Faculty graduates. The picture was taken in the new McGill Engineering Student Centre, which is located on the ground floor of the Frank Dawson Adams Building.



FRESH ACADEMIC FACES

The Faculty of Engineering is growing, having recruited 15 professors in 2006-2007. Some of them are already settling in on campus; others will join McGill later this summer. Here, we meet just a few of our new hires.

Cleaner, Safer Fuels

Hydrogen fuel cells have often been heralded as a clean form of renewable energy, but carrying them around is risky business and motorists understandably shy away from having a tank of compressed hydrogen under the driver's seat. Professor **Jeff Bergthorson**, who joined **Mechanical Engineering** this year following post-doctoral research at the California Institute of Technology, is investigating processes to produce safe hydrogen by extracting it from biofuels such as methanol. The objective is to provide a safe and efficient source of energy that is up to 40 per cent more efficient than burning biomass fuels or natural gas. To learn more about Prof. Bergthorson, check the McGill website at: www.people.mcgill.ca/jeffrey.bergthorson

Concrete Ideas

"In most cases when concrete fails, it's because the concrete has actually deteriorated over time," says **Civil Engineering and Applied Mechanics** professor **Andrew Boyd**, a recent arrival from the University of Florida. His work centres on methods to improve durability, which includes modifying both molecular structures and construction processes. "We're just starting to explore how to modify these materials at the nano-scale in order to achieve a different behavior at the macro-scale," but he says "this approach has lots of potential." www.mcgill.ca/civil/faculty/boyd

Urban Living at its Best

A year ago Montreal workers started tearing down the ramps and overpasses at the du Parc – des Pins interchange near McGill, replacing it with a new intersection that is pedestrian-friendly, easier for drivers to navigate and considerably more attractive. It's the way urban design should be approached, says professor **Nik Luka**, who holds a joint appointment in the **Schools of Architecture and Urban Planning**. Luka leads the new Urban Design specialization offered by the two schools in conjunction with parallel units at the Université de Montréal. The bilingual professor (he completed his master's degree at Laval University, in Quebec City) and his U de M colleagues will work with City of Montreal administrators to develop the program, drawing on real-life issues confronting Montreal. www.mcgill.ca/architecture/faculty/luka

Minds and Machines

The computer is our best analogue to the human brain, and professor **Sam Musallam**, from the California Institute of Technology, is bringing the two closer together. Musallam, jointly appointed in **Electrical and Computer Engineering** and the Department of Physiology in Medicine, unites neuroscience and electrical engineering to study brain-machine interfaces that could one day enable people to operate computers or robots using only their minds. Initially, Musallam's team will work with animals to investigate how cognitive signals might be used to drive prosthetic devices. "The goal is to design systems that will help paralyzed people to communicate and interact with the outside world." www.mcgill.ca/apo/academic-staff/new-faculty/profiles/musallam

ADMINISTRATIVE TEAM

In addition to Dean Christophe Pierre, the Engineering Faculty's senior administrative team is composed of four Associate Deans:

- **Jim Clark** of Electrical and Computer Engineering - **Associate Dean, Academic** www.people.mcgill.ca/james.j.clark
- **Subhasis Ghoshal** of Civil Engineering - **Associate Dean, Student Affairs** www.mcgill.ca/civil/faculty/ghoshal
- **Andrew Kirk** of Electrical and Computer Engineering - **Associate Dean, Research and Graduate Education** www.people.mcgill.ca/andrew.kirk
- **Stephen Yue** of Mining, Metals and Materials Engineering - **Associate Dean, Academic Affairs** www.people.mcgill.ca/stephen.yue

New Faces in the Development Office

Danis Prud'homme, **Edna Mendelson** and **Krish Dasgupta** joined the Engineering Faculty this summer as part of an expanded team working with alumni and corporate benefactors in the Development, Alumni and University Relations Office (DAUR). Prud'homme is the new Director of Development; Edna Mendelson is a new Development Officer and Krish Dasgupta is the new Development and Alumni Relations Associate. They join DAUR stalwarts **Robyn Quimet**, BEd'01, the Faculty's other Development Officer, and **Anabela Fernandes**, DAUR Engineering's Administrative Coordinator.

Heart of the Matter

When engineers look at heart disease, they add a new perspective to assist medical professionals, and, ultimately, patients. Chemical Engineering doctoral student **Leonie Rouleau**, BEng'05, MEng'07, who is a member of professor **Richard Leask's** research team, says "the goal is to develop techniques to study endothelial cells, which line blood vessels and are believed to play a key role in atherosclerosis and cardiovascular diseases." Much of Rouleau's time is spent at the Montreal Cardiac Institute, working with medical researchers to develop more realistic physiological models. As the model is refined, Rouleau says she will clarify the relation between fluid flow and the mechanical structure of the vessel.

Leonie Rouleau



Tackling turbulence to reduce drag

When air flows over an automobile, turbulence accounts for 90 per cent of the drag. "My research focuses on a way to inhibit turbulence by lining the walls of a surface with millions of small, closely spaced pores," says **Nils Tilton**, BEng'03, MEng'06, a doctoral student in the Department of Mechanical Engineering, who is studying computational fluid mechanics with professor **Luca Cortelezzi**. "The pores would sense the state of the flow, and if it starts to become turbulent, they would remove fluid." Besides modeling flow and turbulence, he also experiments with the aural equivalents as a jazz guitarist.

Nils Tilton



Petro-Canada gives boost to Engineering undergrads

McGill Principal and Vice-Chancellor Heather Munroe-Blum and Engineering Undergraduate Student Society (EUS) President Jessica van der Vooren present Petro-Canada President and Chief Executive Officer Ron Brenneman with a McGill jacket following Brenneman's announcement that Petro-Canada will provide \$1-million in undergraduate student scholarships in the Faculties of Engineering, Science and the Desautels Faculty of Management. "Many of our best employees today are McGill graduates," Brenneman said at the ceremony, "and we'd like that pattern to continue."

The gift is part of Petro-Canada's Emerging Leaders Awards Program, which supports post-secondary students in fields related to the energy industry.



Photo: Réjean Meloche

Mining Lab



Roussos Dimitrakopoulos

Industry collaboration increases safety and profit

A mine can be a risky investment, but McGill researchers are making it less so. The COSMO-Stochastic Mine Planning Laboratory that opened this past year investigates ways of assessing risk and optimizing results in mining operations.

"There is no facility like this anywhere in the world," says Mining, Metals and Materials Engineering Department professor Roussos Dimitrakopoulos, holder of the Canada Research Chair in Sustainable Mineral Resource Development and Optimization Under Uncertainty.

He and his team use stochastic processes (mathematical expressions of uncertainty) to develop models that help companies reduce the risks inherent in mining operations. No one else has refined the method as precisely as Dimitrakopoulos, and his research has drawn high praise from colleagues and the mining industry.

The COSMO lab was established with \$50,000 in annual support for five years from industry partners that include BHP Billiton, Rio Tinto, INCO, Barrick Gold, Newmont Gold, DeBeers, AngloGold Ashanti and CVRD.

With its strong industrial partnerships and interdisciplinary and inter-institutional collaboration, the lab will be used as a model for other research operations in McGill Engineering.

Maxwell M. Kalman THE GIFT OF A LIFETIME

The opportunity to celebrate a 100th birthday presents itself to very few people, and when Maxwell M. Kalman, BArch'31, reached that milestone he made an uncommon decision, but one in keeping with the generosity of his character. Rather than be satisfied with receiving the gifts and accolades that he deserved, Kalman decided to reflect on his time at McGill – and to give back.

With his bequest of \$100,000 to honour the landmark birthday, Kalman will provide the means to establish the Maxwell M. Kalman Endowment Fund for students in the School of Architecture.

"I want to help students in architecture focus on the beauty and art of their area of study, and not on how to find a second or third job to make enough money for tuition," he said. Having graduated as an architect just when the Great Depression hit full stride, Kalman is certainly familiar with such challenges.

Kalman, the oldest living graduate of the School of Architecture, came from a modest background and financed his time at McGill through a combination of scholarships, bursaries and hard work. He believes the financial support he received while at McGill had a significant impact on his ability to study and ultimately succeed in the field of architecture. It is with this thought at the fore that Kalman decided to make his generous gift to provide annual support for future students.

During his 35-year career Kalman completed more than 1,000 projects, the majority of them residential: luxury houses, walk-up flats and middle-class duplexes, in styles ranging from traditional to innovative. They include the Norgate shopping centre, built in 1949 as Canada's first strip mall, the Workmen's Circle Centre (now the Sala Rosa) on St. Laurent Blvd. and the innovative Town of Lorraine, north of Montreal Island.

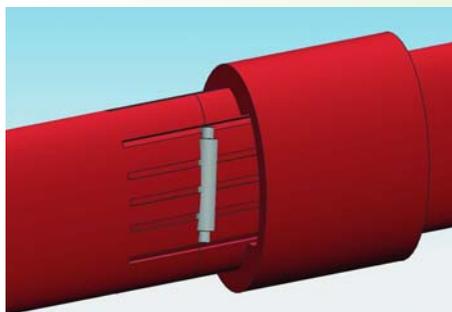
In a speech delivered by his niece at his 100th birthday celebration, Kalman said he is "grateful to God for allowing me to enjoy life for 100 years, and deeply satisfied to know that McGill architecture students will forever benefit from this gift."



A loving patriarch teaches a lesson about the value of giving.

Famed automaker Ferrari seeks design help from McGill students

The students enrolled in professor Damiano Pasini's mechanical design class got an unexpected bonus this past term. Much to their delight, they found out they would be working with world-renowned Ferrari engineers on a real-life design problem.

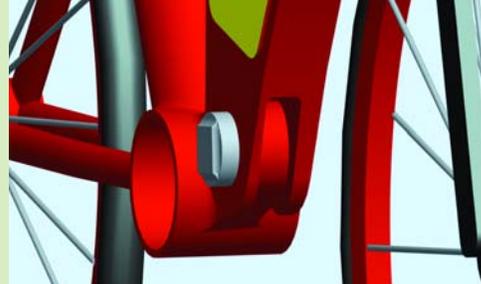


The auto giant asked Pasini's students to submit concepts for a foldable bike that would fit in the trunk of a Ferrari sports car, using specifications that had to be followed to the letter. The folded bike could not exceed 30 x 60 x 80 cm³, the assembly time could not exceed 15 seconds and the force required to fold the bike could not exceed the equivalent of six kilograms.

Engineers at Ferrari's world headquarters in Maranello, Italy, participated in weekly question-and-answer sessions with the McGill students via e-mail, to provide guidance and help the students address unexpected design problems. Preliminary proposals were submitted to the company halfway through the course, and the students refined their final designs according to Ferrari's feedback.

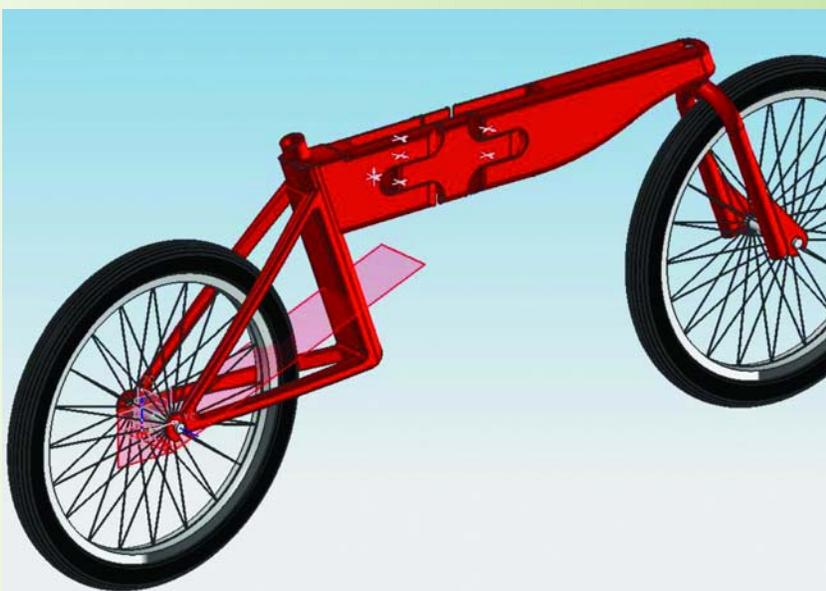
Much of the work centred on developing a prototype for a hinge that would allow the bike to fold, but Pasini says his undergraduate students also had to cope with issues involving gears, shafts, bolts and springs. It was a tall order, but working in teams of five, the students came up with some very impressive results. Ferrari engineers are analyzing the work and will decide if the project is worth pursuing.

The course marked the third initiative involving McGill Engineering and Ferrari. In the summer of 2005 Gaurav Gupta, BEng'05, and Paolo Gatto, BEng'05, won innovative-design scholarships to spend a year working alongside Ferrari engineers in Maranello. McGill's was one of only five university engineering faculties in the world asked to participate in the scholarship competition.



Pasini followed up in 2006 by convincing Ferrari to provide real-life design problems for his spring and summer Mech 498 and 499 interdisciplinary design courses. Students were required to solve actual problems that Ferrari had encountered in designing its cars. Three student teams presented their findings in a videoconference with Ferrari at the end of the first course, and then worked on prototypes during the second.

Pasini is staying in touch with Ferrari to see if other initiatives can be launched, but there is nothing specific on the drawing board at present. "Our students are certainly interested in developing the relationship further," the Italian-born professor says, "but we need to give this some thought to develop a more structured, long-term plan."



Giving Is Important

Your gift can support Engineering Faculty students directly. When you receive a pledge card to make a donation, be sure to mark Engineering or the name of your Department or School in the space provided. And now you can also make your donation online at www.alumni.mcgill.ca/online-giving/. Don't forget to select the Faculty of Engineering as your preferred area of support.

Matching Gifts

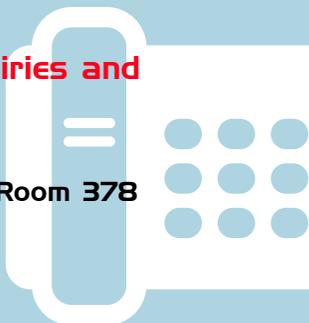
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OPTICAL SYNERGY

**Innovative program helps
Canadians compete internationally**

Researchers at the McGill-based Agile All-Photonics Networks (AAPN) won yet another award in 2006-2007 – this time for strengthening the Canadian communications industry's ability to compete internationally. The Natural Sciences and Engineering Research Council (NSERC) presented the network with its Synergy Award for Innovation, recognizing that AAPN's work has the potential to transform high-tech communications nationally and globally.

Directed by Electrical and Computer Engineering Department Chair David Plant, AAPN was launched in 2003 as a partnership of five universities, five industries and two federal laboratories. The collaborative effort was established as the best way to address challenges facing the optical communications systems and technology sectors as a result of the explosive growth of the Internet. The network's current advances include a topological design tool, detailed optical

switching technology roadmap information, and the technology to test partner hardware in university labs.

Plant credits Tanya Glavicic-Th  berge, BEng'86, and her group in McGill's Office of Technology Transfer for their pivotal role in establishing AAPN. He says that NSERC is suggesting that other Research Networks consider adopting the same type of agreement negotiated by McGill.



David Plant