



Advancing New Perspectives



Construction of a new engineering building began in 2007 to accommodate the Faculty's expansion into emerging areas of research and study. The five-storey, 125,000 square-foot facility will be home to the School of Biomedical Engineering, the Walter G. Booth School of Engineering Practice, and research initiatives in mechatronics and hybrid technologies, energy studies, nanotechnology and micro-systems, and emerging device technologies. The building will also be home to the first-year engineering program, with teaching studios, tutorial rooms, and classrooms designed to enhance the undergraduate experience, and the McMaster-Mohawk Bachelor of Technology Partnership.

Advancing New Perspectives

Challenging conventional thinking. Looking from new angles. Engaging diverse points of view. Engineering faculty and students at McMaster University are advancing new perspectives on many of the central issues of our time.

FOSTERING INNOVATION

The Faculty of Engineering at McMaster University provides an open, innovative and collaborative learning and research environment that promotes new thinking and fresh perspectives. By fostering positive, relevant working relationships among students, faculty, researchers, governments and industry, we are actively engaged in finding answers to crucial questions

in the areas of environmental sustainability, economic growth, technological advancement, human health, and learning.

On the eve of our 50th anniversary as a Faculty, and the opening of our new state-of-the-art teaching and research facilities, this annual report provides a snapshot of our progress in 2007. We invite you take a closer look by visiting the Faculty online at www.eng.mcmaster.ca.



PETER GEORGE

President and Vice-Chancellor

"Critical thinking, interdisciplinary learning and a passion for community are core values of McMaster University. We seek to address the social, cultural and economic needs of our society through a commitment to collaboration, innovation, and excellence in education, research and scholarship. The Faculty of Engineering is at the forefront of developing innovative new programs and modes of learning that make essential contributions to the University's achievements."



DAVID WILKINSON

Dean, Faculty of Engineering

"Many forward-looking initiatives have been undertaken by the Faculty of Engineering over the past several years in response to the changing world around us. These include expanding our research portfolio into areas such as biomedical engineering, nanotechnology and nanomaterials, automotive manufacturing, clean energy technologies, and information and communications. We have also tailored many of our undergraduate and graduate programs to better meet the learning needs of our students. I would like to thank and congratulate our faculty, staff, students and many collaborators in both the private and public sectors for their support and dedication. As I start in my new role as Dean, I look forward to building on these successes and to searching for new ways to better serve our society, both near and far."



PETER SMITH

Associate Dean (Academic)

"Today's engineers must be equipped with the tools necessary to not only excel in the workplace, but to reach beyond current limitations and create positive change in today's society. To this end, the Faculty of Engineering is furthering its commitment to fostering a spirit of innovation and social responsibility. We are also expanding efforts to provide students with a global perspective and greater opportunities to learn under international contexts. We have advanced a strong international presence and are forging global alliances with major international research projects and institutions."



PETER MASCHER

Associate Dean (Research and External Relations)

"Maintaining a reputation as one of the top engineering schools in the world continues to be an essential priority for the Faculty of Engineering. This involves attracting and retaining outstanding faculty and researchers, as well as continually providing challenging and innovative learning and research opportunities. We achieve this by forging relevant and rewarding partnerships with other leading academic institutions, industry and government. Such collaborations are strengthened by encouraging open-minded and forward-looking interactions, by facilitating cross-disciplinary study and investigation, and by removing barriers to creativity."



Reviewing machining projects undertaken for industry are (left to right) Eu-Gen Ng, assistant professor of mechanical engineering; Warren Reynolds, facilities manager, MMRI; Klas Forsström, vice president & general manager, Sandvik Coromant Canada; Mo Elbestawi, vice-president Research and International Affairs, McMaster University; Brian Philip, senior manager of business & productivity development, Sandvik Coromant Canada.

Marilyn Lightstone, Associate Professor of Mechanical Engineering, served as Co-Chair of the 15th Annual Conference of the CFD Society of Canada. The Society promotes the application and understanding of computational fluid dynamics in a broad range of areas, supporting Canada's industrial competitiveness and advancing knowledge in the field.

Driving Innovation

Curiosity, creativity and competition are generating new opportunities for economic and social development. McMaster Engineering is at the forefront of research and education initiatives that are helping to drive this transformation.

MacAUTO ARRIVES

Generations of automobiles have benefited from the knowledge and expertise advanced by the Faculty of Engineering in developing steel, metal alloys and polymers. Today, efforts touch on almost all areas of automotive engineering, including the development of cleaner and more fuel-efficient vehicles, engineering design, software development, power train systems, transportation and logistics, safety, infrastructure and commercialization.

To reflect the breadth of McMaster's involvement in the automotive industry, the Faculty has established the Institute for Automotive Research and Technology, better known as MacAUTO. MacAUTO brings together the many institutes and centres at the University related to the automotive economy and encourages interdisciplinary study and research in collaboration with industry and government.



Ilene Busch-Vishniac was appointed University Provost and Vice-President (Academic) in 2007. She joined McMaster from Johns Hopkins University and became a member of the Faculty in the Department of Mechanical Engineering.

BOOSTING PRODUCTIVITY

The McMaster Manufacturing Research Institute (MMRI) entered into a three-year agreement with Sandvik Coromant Canada that will assist Canadian manufacturers boost productivity. The innovative agreement takes MMRI consulting expertise, research and development facilities, and engineering know-how, and applies it directly to industry. Sandvik Coromant is investing \$100,000 annually to support the initiative.

INVESTIGATING NEW MATERIALS

More than 200 of the best materials researchers and students from across Canada gathered to discuss the next generation of materials being designed for use in manufacturing vehicles, alternative energy sources, photonics, instrumentation and other products. Hosted by the Faculty, the Department of Materials Science and Engineering, and the Brockhouse Institute for Materials Research, Advanced Materials Week included a keynote presentation by Alan Taub, Executive Director, Research and Development, General Motors Corporation.

MASTERING MANUFACTURING

The Faculty introduced a Master of Engineering Degree in Manufacturing for professionals looking to acquire specialized skills addressing the evolving needs of industry. Through the program, students gain industrial experience and intellectual flexibility, encompassing a wide range of engineering disciplines such as metals, polymers, composites, MEMS, metal cutting, and forming.



AUTOMOTIVE RESEARCH (ENGINE AND POWER TRAIN)

- Mechatronics and Hybrid Technologies

AUTOMOTIVE RESEARCH (STRUCTURES)

- GM Canada Centre for Automotive Materials and Corrosion
- Initiative for Automotive Manufacturing Innovation (IAMI)

RELATED CENTRES

- Brockhouse Institute for Materials Research
- McMaster Manufacturing Research Institute
- McMaster Steel Research Centre

WALTER G. BOOTH SCHOOL OF ENGINEERING PRACTICE

- Dofasco Centre for Engineering and Public Policy
- GM Canada Centre for Engineering Design
- Xerox Centre for Engineering Entrepreneurship and Innovation

McMASTER-MOHAWK BACHELOR OF TECHNOLOGY PARTNERSHIP

- Automotive and Vehicle Technology
- Manufacturing Engineering Technology
- Process Automation Technology

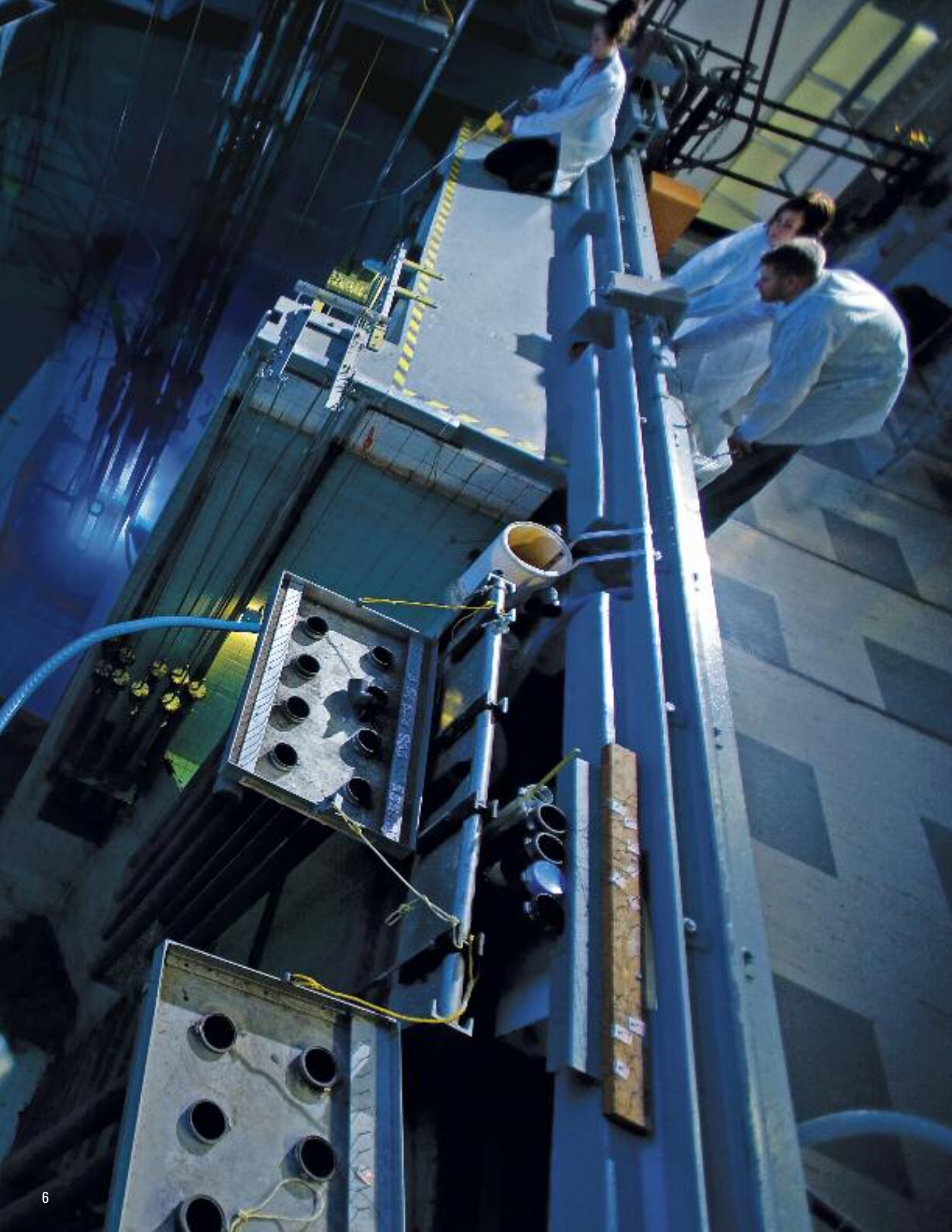
STUDENT INITIATIVES

- McMaster Mini Baja
- McMaster Racing Club (Formula SAE)
- McMaster Solar Car Project

HUMAN FACTORS RESEARCH

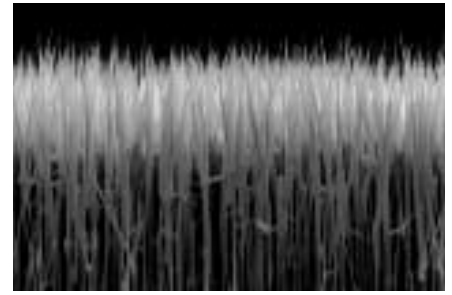
- Institute for Transportation and Logistics
- Labour Studies

MacAUTO



A series of lectures on the important role engineers can play in achieving environmental sustainability was hosted by the Dofasco Centre for Engineering and Public Policy. Gail Krantzberg, a leading expert on the Great Lakes ecosystem and sustainability, is the Centre's Director.

Millions of nearly invisible wires may hold the answer to making solar cells a more affordable source of alternative energy. Nanowire technology developed within the Faculty is able to trap more sunlight and convert it to electricity more efficiently than traditional solar cells.



Pursuing Sustainability

Alternative energy sources, new models for conservation, energy efficiencies, and the role of public policy are being investigated as engineering faculty and students pursue answers to achieving environmental sustainability.

LEADING EDGE OF SOLAR TECHNOLOGIES

McMaster Engineering's reputation as a global leader in materials engineering has placed the Faculty at the leading edge of research in solar technologies.

TELECOM RESEARCH LEADS TO SOLAR CELL BREAKTHROUGH

Engineering physics researchers Rafael Kleiman and John Preston are applying research undertaken for the telecommunications industry to the development of high-efficiency solar cells. ARISE Technologies, a solar energy firm headquartered in Waterloo, Ontario, and the Ontario Centres of Excellence have invested \$4.1 million to further research into a unique application of single crystal layers of compound semiconductors on single crystal silicon.

NANOWIRE RESEARCH APPLIED TO SOLAR CELLS

Nanowire research being conducted by Ray LaPierre, assistant professor of engineering physics, is being applied to solar cells with the potential of making them a more affordable and efficient source of energy. He is working with Cleanfield Energy and the Ontario Centres of Excellence to pursue the commercialization of nanowire technology in the production of solar cells. The three-year initiative is valued at more than half a million dollars.

FLEXIBLE SOLAR CELLS

Adrian Kitai, professor of both engineering physics and materials science and engineering, is working with students from the Xerox Centre for Engineering Entrepreneurship and Innovation to develop and commercialize flexible solar cells that operate at 12 to 14 per cent efficiency, approximately twice that of competitive products. One of the advantages the new technology offers over rigid solar cells is that it is not limited to flat surfaces and is much easier to install.

RECYCLING SPENT NUCLEAR FUEL

Engineering physics professor John Luxat is leading an initiative to advance development of a process to recycle spent nuclear fuel that will reduce current stockpiled nuclear waste and the storage space it requires. The process involves separating nuclides, which are the true waste product in nuclear power generation, from actinides, which can be reused as nuclear fuel. McMaster Engineering is also advancing technologies related to reactor safety and operations, and undertaking programs to increase nuclear expertise.

HARNESSING THE WIND

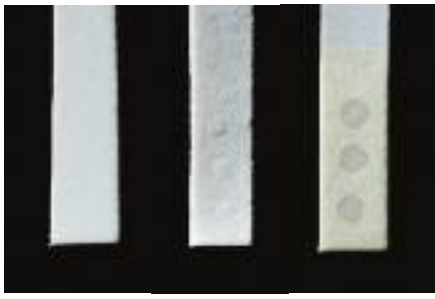
Research and development undertaken by McMaster's Department of Mechanical Engineering played a significant role in the official launch of a next-generation wind turbine by Cleanfield Energy. The Faculty led the testing of the Cleanfield V3.5 turbine – a three-metre tall, vertical-axis wind turbine designed to provide electrical power for individual homes and businesses.

SUSTAINABILITY SCHOLARSHIP

The Norm Lockington Sustainability Scholarship was awarded to Peter Topalovic, a Master's student in the Dofasco Centre for Engineering and Public Policy, for his commitment to environmental sustainability and academic excellence. The award is named after former Dofasco vice-president Norm Lockington.

MASTERING ENERGY MANAGEMENT

A new Master's-level course in Energy Management is being offered through the Advanced Design & Manufacturing Institute. Led by McMaster professor Mohamed Hamed, the course is the first of its kind in Ontario.



The presence of dangerous bacteria or viruses can be indicated by the change of colour on a bioactive paper strip, which is an area of research being pursued by the SENTINEL Bioactive Paper Network, led by Robert Pelton, professor of chemical engineering at McMaster.

Kim Jones, assistant professor of chemical engineering, was interviewed by Regenerative Medicine about her innovative research into tissue engineering designed to repair, replace or regenerate diseased or damaged tissue.

Transforming Health

Increased collaboration between engineering and the life sciences is leading to the development of new technologies that hold the promise of improved patient care, diagnostics, disease prevention and quality of life.

BIOACTIVE PAPER HOLDS GLOBAL PROMISE

Research into the development of a new technology termed bioactive paper by the SENTINEL Bioactive Paper Network was profiled by *The New York Times Magazine* in its annual “Year in Ideas” issue. SENTINEL is pursuing the development of low-cost and easy-to-use paper-based products with biologically active chemicals that can detect and ward off life-threatening bacteria and viruses. The term “bioactive paper” was coined by Robert Pelton, scientific director of SENTINEL and a professor of chemical engineering at McMaster who specializes in pulp-and-paper research. Potential products being investigated include dipsticks that can detect and purify unsafe drinking water; food packaging that signals the presence of E. coli and salmonella; hospital masks that detect and deactivate harmful airborne viruses such as SARS; and paper strips that can check for banned pesticides on produce. SENTINEL is comprised of researchers from 11 universities across Canada, eight industry partners, and federal and provincial government agencies.

CPRGLOVE RECEIVES INTERNATIONAL ACCLAIM

Three undergraduate students from the Faculty’s electrical and biomedical engineering program have developed an innovative, life-saving device

that has received numerous awards and accolades over the past year. Corey Centen, Nilesh Patel and Sarah Smith are developers of the CPRGlove, which was invented as a final-year design project to improve survival rates from cardiac arrest.



The CPRGlove was featured as one of the Top 10 inventions of 2007 by *Popular Science Magazine*.

The CPRGlove has been named one of the best inventions of 2007 by *Time Magazine* and one of the Top 10 inventions of 2007 by *Popular Science Magazine*. It was the winner of the undergraduate category at the prestigious Collegiate Inventors Competition, winner of the Innovative Design Category at the Ontario Engineering Competition, second in the Innovative Design Category at the Canadian Engineering Competition, second at the 2007 IEEE Canada/Telus Innovation Competition, and also second at the Ontario Enterprize 2008 business plan competition. The team is currently pursuing development and marketing of the CPRGlove through their company, Atreo Medical.

LIFE-SAVING DIAGNOSTICS

The Faculty’s Micro- and Nano-Systems Laboratory is conducting research focused on the development of miniaturized, low-cost and easy-to-use prototypes for imaging and sensing in health care and environmental applications.

One of the more advanced projects is the development of a pill-sized biosensor that can screen for, detect and potentially treat cancer and other diseases when they are still at a single-cell size.





A prototype display featuring unique fibre optic technology developed by professor Adrian Kitai is being tested in the McMaster University Student Centre. (Left to right): Lori Diamond, director of MUSC, stands with Cristian Nunez and Nimesh Bahl who are commercializing the venture through the Xerox Centre for Engineering Entrepreneurship and Innovation.

Sorina Dumitrescu, assistant professor of electrical and computer engineering, received a 2007 University Faculty Award from NSERC recognizing her as a promising Canadian researcher. Her research focuses on multimedia computing and communications algorithms.

Signalling Change

Productivity, problem-solving and performance are at the centre of McMaster Engineering's research and learning efforts, as we investigate the expanding opportunities presented by new and emerging technologies.

EXPANDING IT EDUCATION

More than ever, computing and software professionals are needed to apply their creativity, imagination and technical knowledge to fuel change, drive expansion and contribute to improvements in almost every area of our society.

The Department of Computing and Software has added several new programs to its curriculum over the past few years, including Software and Game Design, and Mechatronics, to attract more students to study information technology. This past year, they added two new programs:

BUSINESS INFORMATICS

Business Informatics is tailored to students interested in pursuing studies and careers involving the application of information technology to organizational and financial applications. The focus lies on the planning, development, implementation, operation, optimization and economic use of information and communication systems.

EMBEDDED SYSTEMS

Students in this program are trained to be software engineers and given exposure to: electrical power and electronics; physical interfacing of digital and analog electronics with the computer; and software design for embedded systems and Digital Signal Processors (DSP). This includes hands-on labs in designing, documenting, implementing and testing embedded systems.

RFID IN THE ISLANDS

The McMaster RFID Applications Lab (MRAL) – an initiative between McMaster University, EPCglobal Canada, Hewlett-Packard, IPICO, RF Code, Deloitte, Sun Microsystems, LRNI, and the Ontario Centres of Excellence – was selected to provide consulting services to Radio

Frequency Identification Trinidad & Tobago. RFID technology is used to track or identify a product or object using radio waves. One significant area of application to date is in supply chain management. MRAL is the only initiative of its kind in Canada.

MATHEMATICAL MODELERS AT McMASTER

The Faculty played host to the tri-annual International Conference on Continuous Optimization – a gathering of 450 specialists from more than 35 countries working in the field known as continuous optimization or, more formally, mathematical programming. This is the first time the event was held in Canada. NASA, Boeing, General Motors, IBM, Microsoft, Raytheon, CIBC, Exxon Mobil, and Honeywell, along with researchers from leading universities and government laboratories, were represented at this important event. Eissa Nematollahi, a member of the Advanced Optimization Laboratory at McMaster and a PhD student in the Department of Mathematics and Statistics, was selected as one of three finalists in the Young Researcher competition during the conference.

START-UPS MAKE CANADA'S TOP 10

Two technology start-up projects from the Xerox Centre for Engineering Entrepreneurship and Innovation were among the winners of Canada's Top 10 Competition in 2007, organized by the Ottawa Centre for Research and Innovation. The first is a liquid fiber optic display that was selected in the technology category and the second project involves the development of high-efficiency, flexible solar cells, which was chosen in the clean technology category. The winning fiber optic technology has been installed in McMaster University's Student Centre, where it is being used to promote events and campus announcements.





Denise Gosselink joined the Faculty as assistant professor of Engineering 1 and is involved with the Engineering Study Abroad Program.



Participating in a half-day education forum hosted by the McMaster-Mohawk Bachelor of Technology Partnership are (left to right) Murray Elston, President and CEO, Canadian Nuclear Association; MaryLynn West-Moynes, President, Mohawk College; Art Heidebrecht, Executive Director, McMaster-Mohawk Bachelor of Technology Partnership; Cheryl Jensen, Vice-President, Technology, Apprenticeship & Corporate Training, Mohawk College; Mo Elbestawi, Vice-President, Research and International Affairs, McMaster University

Engineering Education

Demand for engineers has never been greater. New challenges ranging from climate change and international development to productivity and human health, require highly qualified professionals who offer both technical knowledge and social understanding.

BACHELOR OF TECHNOLOGY

The McMaster-Mohawk Bachelor of Technology Partnership received \$16.5 million from the Ontario government to provide the infrastructure needed to offer four-year degree/diploma programs for students graduating from high school. Programs in automotive and vehicle technology, biotechnology and process automation are designed to meet changing skills required by industry. Courses are designed for students who learn best by doing and combine advanced technical and management studies, labs and co-op placements.

The Bachelor of Technology program also received \$120,000 from the Woodbridge Group for the establishment of a lectureship that will see industry specialists bring advanced industrial knowledge into the classroom.

NEW INTERNATIONAL STUDIES PROGRAM

The Faculty's Engineering and Society Program has launched a new five-year Engineering and International Studies Program that will see future engineers trained to understand the complexities associated with working in a global environment. This includes understanding different cultural, political, religious and historical backgrounds of potential collaborators, and technical training in areas such as multi-jurisdictional project and supply chain management.

ENGINEERING STUDY ABROAD PROGRAM

In its second year, twelve students in the Engineering Study Abroad Program (ESAP) traveled to the industrial heartland of Russia for eight weeks to learn about steel, structures and that country's unique culture. This year, the Faculty has expanded the ESAP program to include Brazil in partnership with Federal University of Rio Grande do Norte (Natal) and Federal University of Bahia (Salvador).

ENGINEERS WITHOUT BORDERS

The McMaster chapter of Engineers Without Borders sponsored two students to work on development projects in Africa. Daniel Langdon ran workshops with local government in Saboba, Ghana while Denis Beaulne worked with Canadian Physicians for Aid and Relief (CPAR) near Lilongwe, Malawi on food security and crop assessment initiatives.

WOMEN IN ENGINEERING – GO ENG GIRL

More than 300 young women in grades 7 to 10 took part in the annual Go ENG Girl program at McMaster. Students met with women currently studying engineering, participated in hands-on activities, listened to guest speakers, toured engineering facilities and learned about rewarding careers in engineering.

HIGH SCHOOL STUDENTS LEAP AHEAD

The Learning Enrichment Advancement Program (LEAP), the Faculty's summer camp for high school students, has launched Headstart. Headstart offers students an opportunity to earn up to two first-year engineering credits prior to starting the program in September. LEAP, now in its fourth year, has grown from 12 students in 2005 to 40 students in 2007.

VENTURE ENROLMENT CLIMBS

The Venture Engineering and Science, Computer and Technology Camps at McMaster surpassed the 1,000 enrolment mark for the first time this past summer. Voted the 'Best Summer Camp' in the Hamilton region, Venture offers programs to elementary-aged students and introduces them to the world of engineering, science and technology in a fun learning environment.

Departments and Schools

McMaster Engineering offers undergraduate and graduate study in seven engineering disciplines. Opportunities for specialized interdisciplinary study at the graduate level are offered through three engineering schools.

CIVIL ENGINEERING



Ghani Razaqpur
Department Chair

Civil Engineering deals with infrastructure development, maintenance and sustainability for improved quality of life. Civil Engineers design and construct safe buildings, bridges, airports, highways, dams, harbours, water treatment facilities, efficient waste disposal, and effective transportation systems. They apply advanced scientific and engineering methods to plan, design, construct, maintain, rehabilitate, and manage modern urban infrastructure systems and ensure that they are safe, functional, durable and economical. Faculty at McMaster's Department of Civil Engineering use the latest experimental and analytical methods to conduct fundamental and applied research in environmental and water resources engineering, structural and earthquake engineering, geo-technical engineering, construction materials, and computational mechanics.

Research Facilities: Environmental Laboratory | Geotechnical Laboratory | Applied Dynamics Laboratory (Structural Testing Laboratory) | Computational laboratories | Centre for Effective Design of Structures

CHEMICAL ENGINEERING



Andrew Hrymak
Department Chair

Chemical engineers use basic principles of chemistry, mathematics, physics, biology and economics to design, operate and troubleshoot processes to make the materials we use every day. McMaster research strengths include polymer production and processing, optimization and control of chemical processes, interfacial engineering, membranes for bioprocesses, and biomedical engineering. Graduates of the Department work in a variety of positions in business and industry, including utilities engineer, marketing manager, procurement engineer, quality control engineer, process automation engineer and plant manager.

Research Facilities: McMaster Advanced Control Consortium | Centre for Advanced Polymer Processing and Design | McMaster Centre for Pulp and Paper Research | McMaster Institute for Polymer Production Technology

COMPUTING AND SOFTWARE ENGINEERING



Martin von Mohrenschildt
Department Chair

Most modern engineering products and devices that we use in our daily lives either contain or are built with the help of software. The Department of Computing and Software focuses on the design and development of software, computer systems, embedded systems and algorithms. The Department offers undergraduate and graduate programs in Software Engineering with the option of Game Design or Embedded Systems, Mechatronics Engineering, Computer Science and Business Informatics.

Research Facilities: Software Quality Research Laboratory | Advanced Optimization Group | Applied Computer Systems Group | Algorithms Research Group | Embedded Systems Laboratory | Motion System Laboratory

ELECTRICAL AND COMPUTER ENGINEERING



K. Max Wong
Department Chair

The Department of Electrical and Computer Engineering is the largest department in the Faculty of Engineering. It consistently ranks nationally and internationally among the best for its vigorous research program, particularly in communications, signal processing, networks, microelectronics, photonics, computer engineering and biomedical engineering. Electrical and Computer Engineering involves the use of scientific discoveries and practical knowledge in electric, electronic and digital circuit technology to create devices and systems that can be used to benefit mankind. Biomedical engineering involves the application of electrical and other technologies for the benefit of health science.

Research Facilities: Biomedical Engineering Laboratories | Communication Technology Research Centre | Computational Electromagnetics Laboratory | Electronics, Control and Computer Engineering Laboratory | Microwave Acoustics Laboratory | Optoelectronics Research Laboratory | Power Research Laboratory

ENGINEERING PHYSICS



Harold Haugen
Acting Chair

The Department's academic program is focused on three broad themes: nano- and micro-devices, photonics and nuclear engineering/energy systems. These lead to applications in a variety of technologies used in advanced electronics, optical and wireless communications, sensors, lasers, biophotonics, biomedical devices, nanotechnologies, photovoltaics, and nuclear physics. Faculty and graduate students work with colleagues across Canada on innovations in photonics, information technology, environmental monitoring, biomedical sciences, and renewable energy.

Research Facilities: McMaster nuclear reactor | Clean rooms for nano-, micro-, and photonic device fabrication | Ultrafast laser laboratory | Diode laser and integrated optics research laboratories | Molecular beam epitaxy and chemical vapor deposition facilities for thin film deposition | McMaster positron laboratory | Centre for Emerging Device Technologies for nano- and micro-device fabrication and testing

MATERIALS SCIENCE AND ENGINEERING



Ken Coley
Department Chair

New technologies developed through materials science and engineering will continue to make startling changes in our lives in the 21st century. Researchers in Materials Science and Engineering study the science and technology of producing materials with properties and shapes suitable for practical use, such as metals, ceramics, polymers and semiconductors. Recently, the Department was ranked among the top 10 materials departments in North America.

Research Facilities: Brockhouse Institute for Materials Research | Canadian Centre for Electron Microscopy | Steel Research Centre | Centre for Automotive Materials and Corrosion

MECHANICAL ENGINEERING



Samir Ziada
Department Chair

Mechanical Engineering uses principles of physics and mathematics to design and manufacture all types of mechanical systems used in a wide variety of industries. Occupying three floors of the John Hodgins Engineering Building on campus, the Department includes laboratories containing major instrumentation and data acquisition systems needed for leading-edge research in thermo-fluid sciences, mechanics and design, biomechanics, and manufacturing engineering.

Research Facilities: Thermal management | Thermal processing | Metal forming | Machine tools and metal cutting | CAD/CAM | Robotics | Biomechanics | Aeroacoustics | Flow-induced vibration | Wind tunnels | Microfluidics | Micro-machining | Metal casting and solidification processing | Mechatronics

WALTER G. BOOTH SCHOOL OF ENGINEERING PRACTICE



Andy Hrymak
Director

Engineers are being asked to manage increasingly complex issues that require in-depth knowledge of design, innovation, entrepreneurship and the impact of new and emerging technologies on society. Working across University facilities and in partnership with government, industry and academic institutions in Canada and around the world, the School advances interdisciplinary education and research by providing systematic mechanisms for technology transfer, as well as new knowledge and understanding in the areas of public policy, industry practice, and technological, social and ecological systems.

Research Facilities: Dofasco Centre for Engineering and Public Policy | General Motors of Canada Centre for Engineering Design | Xerox Centre for Engineering Entrepreneurship and Innovation

McMASTER SCHOOL OF BIOMEDICAL ENGINEERING



John Brash
Director

The School was established in 2005 with a mandate to undertake cutting edge research and to train students to the PhD level in interdisciplinary science and technology that straddles the biomedical and engineering fields. The School now offers MSc and PhD programs in Biomedical Engineering with current enrolment of 32 students. Research is ongoing in several key areas including biomaterials, tissue engineering, biomedical imaging, medical robotics, bioprocessing, biomechanics, and biophotonics. The School will move into space in the new Engineering building in early 2009. The new research laboratories, offices and other facilities will bring together faculty and students in a single location, thus promoting collaborations and interactions that will greatly enhance the research and educational programs of the School.

McMASTER SCHOOL OF COMPUTATIONAL ENGINEERING AND SCIENCE



Tamás Terlaky
Director

Computational engineering and computational science are described as the "third wave" of scientific investigation, alongside scientific theory and physical experimentation. Researchers use computational simulation, computational modeling and optimization to pursue investigations into territories that were previously beyond their reach. Applications range from understanding pandemics, to predicting weather patterns, to improving the safety of our cars, to determining the most cost-efficient way to design a computer chip. The School draws upon the expertise of more than 50 professors from engineering, science and business.

Research Facilities: Advanced Optimization Laboratory | Advanced Signal Processing Laboratory | Applied and Industrial Mathematical Sciences Laboratory | Bioinformatics Research Laboratory | Communications Research Laboratory | McMaster Advanced Control Consortium | Neural Computation Laboratory | Simulation Optimization Systems Research Laboratory

Building Momentum

The Faculty of Engineering at McMaster University has distinguished itself internationally for innovative educational programming and research. Established in 1958, its numerous institutes, centres and laboratories are collaborating on hundreds of research projects with the public and private sectors.

BUILDINGS

- Engineering Building for Research and Education (Spring 2009)
- John Hodgins Engineering Building
- John Hodgins Engineering Building Annex
- Chemical & Bioengineering Wing
- Information Technology Building
- Information Technology Building Annex
- Communications Research Laboratory
- Tandem Accelerator Laboratory Annex
- Applied Dynamics Laboratory
- Nuclear Research Building
- Thode Library of Science and Engineering

GRADUATE SCHOOLS AND PROGRAMS

The Faculty of Engineering offers programs of study toward graduate degrees at the levels of M.A.Sc., M.Eng. and Ph.D. across all disciplines within the Faculty. Innovative degree programs reflecting new streams of graduate study have also been developed. Three graduate schools promote interdisciplinary study and research in emerging areas of engineering.

- McMaster School of Biomedical Engineering
- McMaster School of Computational Engineering and Science
- McMaster School of Engineering Practice
- Master of Engineering Design (M.E.D.)
- Master of Engineering Entrepreneurship & Innovation (M.E.E.I.)
- Master of Engineering & Public Policy (M.E.P.P.)
- Master of Engineering in Manufacturing (M.Eng. in Manufacturing)

Walter Booth, Chairman of the Timberland Group of Companies, donated \$2 million towards the construction of the new engineering building. In recognition of his contribution, the School of Engineering Practice will carry his name. Mr. Booth also donated \$1 million in 2003 to establish the Walter G. Booth Chair of Engineering Entrepreneurship & Innovation. He is an alumnus of the first graduating class in Engineering, and earned his Master's degree from McMaster in 1965.



JOINT VENTURES

- McMaster-Mohawk Bachelor of Technology Partnership

INSTITUTES AND CENTRES

- Brockhouse Institute for Materials Research
- Centre for Advanced Polymer Processing and Design
- Centre for Effective Design of Structures
- Centre for Emerging Device Technologies
- Centre for Mechatronics and Hybrid Technologies
- Centre for Research in Micro- and Nano-systems
- Communication Technology Research Centre
- Dofasco Centre for Engineering and Public Policy
- GMC Centre for Automotive Materials and Corrosion
- GMC Centre for Engineering Design
- McMaster Centre for Pulp and Paper Research
- McMaster Institute for Automotive Research and Technology (MacAUTO)

- McMaster Institute for Energy Studies
- McMaster Institute for Polymer Production Technology
- McMaster Manufacturing Research Institute
- Steel Research Centre
- Xerox Centre for Engineering Entrepreneurship & Innovation

PROGRAMS

Through its seven departments, the Faculty of Engineering offers degree programs in the following areas:

- Business Informatics
- Chemical Engineering
- Chemical Engineering & Bioengineering
- Civil Engineering (Structural/Geotechnical)
- Civil Engineering (Water/Environmental)
- Computer Engineering
- Computer Science
- Electrical Engineering
- Electrical & Biomedical Engineering
- Engineering and International Studies
- Engineering and Management (combined with most programs)

- Engineering and Society (combined with most programs)
- Engineering Physics
- Environmental Engineering
- Materials Science and Engineering
- Mechanical Engineering
- Mechatronics Engineering
- Software Engineering
- Software Engineering & Embedded Systems
- Software Engineering & Game Design

Internship and Co-op Options with most programs

CENTRES OF EXCELLENCE

McMaster serves as the administrative centre for the following research networks:

- Canadian Centre for Electron Microscopy
- Initiative for Automotive Manufacturing Innovation
- Ontario Photonics Consortium
- SENTINEL – Bioactive Paper Network
- University Network of Excellence in Nuclear Engineering

UNIVERSITY PERFORMANCE INDICATORS	Ontario	G13	Canadian
University Research Intensity ¹	2nd	2nd	2nd
Quality of Education Overall Ranking ²			A-
Academic Reputation ²			A-

¹ Research Infosource Inc. 2007 ² Globe and Mail 2007 University Report Card

ENGINEERING PERFORMANCE INDICATORS	Ontario	G13	Canadian
Average Dollar Amount of NSERC Grants ³	2nd	1st	4th
Size of Undergraduate Engineering Student Population ⁴	3rd	6th	7th
Size of Graduate Engineering Student Population ⁴	3rd	7th	9th
PhD Degrees Awarded ⁴	3rd	4th	4th
Percentage of Female Engineering Students ⁵	7th	n/a	n/a
Employment Rate of 2004 Graduating Class ⁶ (Surveyed two years after graduation)	96%		

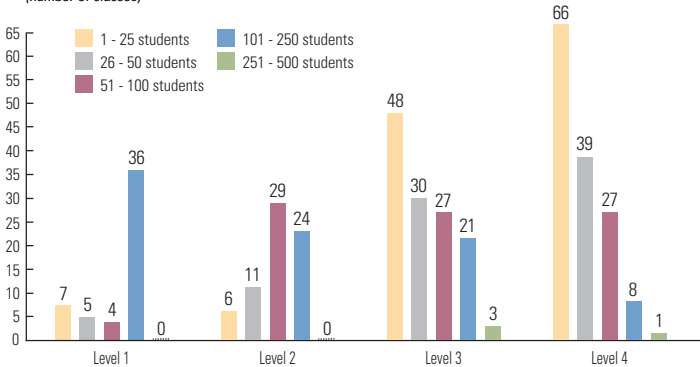
³ NSERC Web site ⁴ CCPE, FT Accredited programs (based on 2005 current available data) ⁵ Council of Ontario Deans of Engineering ⁶ Ministry of Training, Colleges & Universities (Ontario)

ENGINEERING STATISTICS	
Undergraduate students (FT/PT)*	3,142
Graduate students (FT/PT)*	797
Degrees awarded (undergraduate)	501
Degrees awarded (graduate)	188
Faculty members	148
Staff	116
Engineering 1 (full-time, 1st year undergraduate students)	898

*Includes Computer Science students

UNDERGRADUATE CLASS SIZE

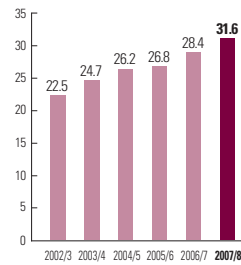
(number of classes)



Distribution of Class Size By Level

OPERATING BUDGET

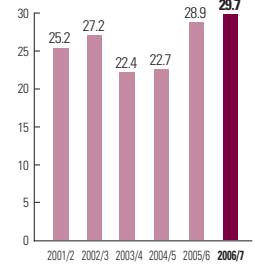
(millions of dollars)



40% growth over the last six years

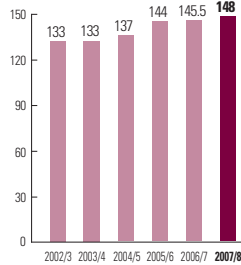
RESEARCH FUNDING

(millions of dollars)



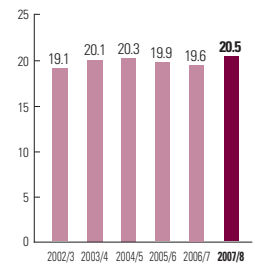
\$156.1 M in external research funding over the last six years

ENGINEERING FACULTY



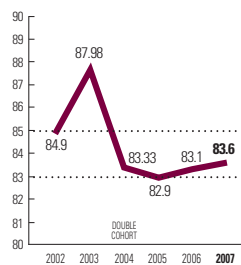
Faculty growth over the last six years

STUDENT-FACULTY RATIO



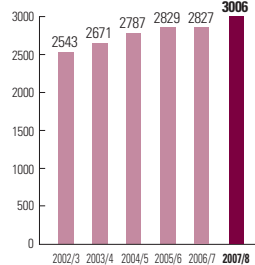
Average student-faculty ratio over the last six years

ENTERING AVERAGES



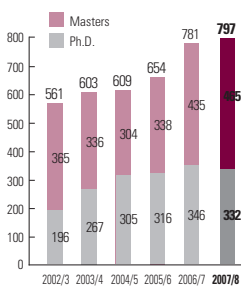
Average grades at admission over the last six years

ENGINEERING FULL-TIME ENROLMENT



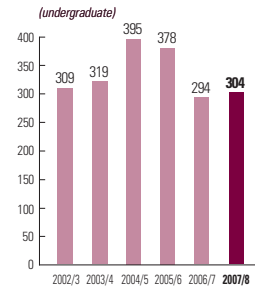
Student enrolment growth over the last six years (excluding Computer Science)

GRADUATE STUDENTS



Graduate student growth over the last six years

INTERNATIONAL STUDENTS



International student enrolment over the last six years

ACADEMIC DEPARTMENT/ SCHOOL STATISTICS	Chemical		Civil	Computing and Software	Electrical and Computer	Engineering Physics	Materials Science and Engineering	Mechanical	Level 1/ Other	School of Engineering Practice*	Computational Engineering and Science*	School of Biomedical Engineering*
Undergraduate students (FT/PT)	290	361	232	543	135	178	403	960	n/a	n/a	n/a	
Graduate students	66	74	104	173	100	62	113	n/a	44	31	30	
Degrees awarded (undergraduate)	56	69	45	134	48	35	114	n/a	n/a	n/a	n/a	
Degrees awarded (graduate)	17	18	37	33	14	16	27	n/a	24	2	n/a	
Faculty members	14	14.5	26	32	14	14	22	6	53**	56**	60**	
Staff	12	6	8	9	17	14	12	35	2	.5	.5	

*New graduate programs. **Joint appointments with academic departments.

Awards and Accolades

McMaster Engineering faculty, staff and students continually distinguish themselves professionally and academically, as well as in areas outside of their chosen fields. Whether it is recognition for high academic standing, for excellence and innovation in research, for contributions made to a professional organization or for going above and beyond as a lecturer, staff member or student, these individuals bring honour to themselves, the Faculty of Engineering and to McMaster University.

McMASTER UNIVERSITY FACULTY OF ENGINEERING LEADERSHIP AWARD

- **Joesph Liburdi**, President, Liburdi Engineering Limited

L.W. SHEMILT DISTINGUISHED ENGINEERING ALUMNI AWARD

- **Stephen Elop**, President, Microsoft Business Division (B.Eng. Computer Engineering and Management, 1986)

ENDOWED CHAIRS

- **Wael W. El-Dakhkhni**, Martini, Mascarin and George Chair in Masonry Design

PROFESSIONAL ASSOCIATIONS AND SOCIETIES

- **Jacques Carette**, appointed Chair of the Electronic Services Committee for the Canadian Mathematical Society
- **Paulin Coulibaly**, Early Researcher Award
- **Jamal Deen**, inducted to the Canadian Academy of Engineering
- **Sorina Dumitrescu**, 2007 NSERC University Faculty Award
- **Qiyin Fang**, Early Researcher Award
- **Qiyin Fang**, CFI Leaders Opportunity Fund/ORF Research Infrastructure
- **Raymond Findlay**, 2007 IEEE Canada A.G.L. McNaughton Gold Medal
- **Gord Irons**, 2007 Alcan Award from the Metallurgical Society of CIM (Canadian Institute of Mining, Metallurgy and Petroleum)
- **Gyan Johari**, Doctor Honoris Causa degree from the University of Dublin
- **Mehran Kasra**, CFI Leaders Opportunity Fund/ORF Research Infrastructure
- **John MacGregor**, elected to the Royal Society of Canada
- **David Novog**, CFI Leaders Opportunity Fund/ORF Research Infrastructure
- **Nikolas Provatias**, Early Researcher Award
- **Stephen Veldhuis**, Early Researcher Award
- **John Vlachopoulos**, 2007 Mason Award, Canadian Society for Rheology
- **David Weaver**, inducted to the Canadian Academy of Engineering
- **Max Wong**, inducted to the Canadian Academy of Engineering
- **Max Wong**, elected to the Royal Society of Canada
- **Donald Woods**, Honorary Doctor of Science degree, McMaster University
- **Peidong Wu**, Early Researcher Award
- **Hatem Zurob**, CFI Leaders Opportunity Fund/ORF Research Infrastructure



TEACHING AWARDS

- **David Capson**, McMaster Lifetime Teaching Achievement Award, MSU, 2007
- **Brian Baetz**, Teaching Award, MSU 2007
- **Hatem Zurob**, Merit Award, MSU 2007

STAFF AWARDS & RECOGNITION

- **Maurice Forget**, Veronika Czerneda Staff Award

UNIVERSITY AND FACULTY OF ENGINEERING APPOINTMENTS

- **Ilene Busch-Vishniac**, University Provost and Vice-President (Academic), Professor, Department of Mechanical Engineering
- **Mo Elbestawi**, Vice-President, Research and International Affairs
- **David Wilkinson**, Dean, Faculty of Engineering
- **Peter Smith**, Acting Dean, Faculty of Engineering (July 2007 – March 2008)
- **Jun Chen**, Assistant Professor, Electrical and Computer Engineering
- **James Cotton**, Associate Professor, Mechanical Engineering
- **Denise Gosselink**, Assistant Professor, Engineering 1
- **Matiar Howlader**, Assistant Professor, Electrical and Computer Engineering
- **Eu-Gene Ng**, Assistant Professor, Mechanical Engineering
- **Michael Noseworthy**, Assistant Professor, School of Biomedical Engineering
- **Alexandru Patriciu**, Assistant Professor, Electrical and Computer Engineering
- **Gregory Wohl**, Assistant Professor, Mechanical Engineering
- **Jian-Kang Zhang**, Assistant Professor, Electrical and Computer Engineering

STUDENT AWARDS

- **Corey Centen, Nilesh Patel and Sarah Smith**, Best Invention of 2007, Health Category, *Time Magazine*; Top-10 Invention of 2007, *Popular Science Magazine*; Undergraduate Winners, Collegiate Inventors Competition (CIC); Winner, Innovative Design Category Ontario Engineering Competition; Second Place, 2007 IEEE Canada/TELUS Innovation Competition; Second Place, Innovative Design Category, 2007 Canadian Engineering Competition; Second Place, Ontario Enterprise 2007
- **Lauren Davies, Marka Jansen, Paul Okrutny, and Patrick Wilson**, Second Place, Consulting Engineering Category, 2007 Canadian Engineering Competition (CEC)
- **Stephen Niedojadlo, Jonathan (Kwok Kin) Ho, and Jonathan (Chin Hung) Lo** winners of the Minerva Canada James Ham Safe Design Award
- **Kimia Ghabadi, Olesya Peshko, Imre Polik and Oleksandr Romanko**, First Place in the Student Simulation Competition, Canadian Operational Research Society
- **Sanjay Patel, Shiqi Cao and William Hua**, Fourth Place in the 2007 East Central North America Regional Programming Contest
- **McMaster Engineering Concrete Toboggan Team**, First Place, Great Northern Concrete Toboggan Race

Dean's Advisory Board



David Wilkinson was appointed the new Dean of Engineering effective April 1, 2008. He succeeds Mo Elbestawi who was promoted to Vice-President, Research and International Affairs. Peter Smith, Associate Dean (Academic), was acting Dean during the interim (July 2007 – March 2008).



Douglas Barber, OC
(Chair)
Genum Corporation
(retired)



Norm Lockington
Vice President, Technology
Dofasco *(retired)*



Colleen Shannon
Partner
Borden Ladner Gervais



Walter Booth
Chairman & CEO
Timberland Equipment



Bob Magee
President & CEO
The Woodbridge Group



Gary Sohal
President
AUDCOMP



Ken Carpenter
President & CEO
Burlington Technologies



Les McLean
President
Leslie C. McLean
Consulting



Pat Stevens
*Senior Director, Optimization
& Integration*
Petro-Canada Products



Mike Fielding
Chief Executive Officer
StrataFlex



Joe Ng
President
JNE Consulting Limited



LaVern Sula
*General Director of Engineering
& Product Planning*
General Motors of Canada



Cheryl Jensen
*Vice President, Technology,
Apprenticeship & Corporate
Training, Mohawk College*



Michael Pley
President
COM DEV



Tim Valters
President
Selkirk Canada
Corporation



In 2008, the Faculty will be celebrating its 50th anniversary. A year-long series of events has been planned to celebrate and acknowledge the achievements and contributions made by faculty, students, staff, and partners in the public and private sectors. We encourage you to visit us online at www.eng.mcmaster.ca/50th to find out more about upcoming events and celebrations planned throughout the year.

OUR MISSION

The Faculty of Engineering is a scholarly community committed to the pursuit of excellence in education, research and service, and to fostering the quality of academic life. This pursuit is sensitive to changing technologies and social development.

OUR VISION

The Faculty of Engineering is committed to achieving and maintaining international excellence and distinction in education, scholarship and community service. We will strive to be Canada's leading student-centred, research-intensive Engineering Faculty. We will ensure that our educational and research programs satisfy the broader role for engineers in the new millennium, and emphasize a culture of mutual respect among faculty members, staff and students.

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