

EXECUTIVE SUMMARY / OVERVIEW

The rapid pace of change in technology and the global marketplace have created a new corporate environment.

Companies are seeking leaders to develop synergies between employees and partners for creating new business opportunities and for significantly improving productivity while reducing costs.

The Master in Manufacturing Management (MMM) Program provides a technical alternative to an MBA with active industry involvement and a targeted focus on operations. It is the only full-time program of its kind in Canada. Its mission is to graduate individuals with integrated skills in engineering, management and leadership, who are specialized in manufacturing, supply chain and logistics operations. The program aims to provide students with the tools necessary for dealing with the changing demands of the global economy.

MMM was formulated as a partnership between McGill University's Faculties of Engineering and Management and Industry Partners. A key feature of the program is industry participation and interaction. To ensure a profound comprehension of the issues and challenges facing business today, case studies, plant tours, seminars, industrial projects and internships are provided by corporate sponsors and partners. The major emphasis of these professionally-oriented activities is on improving productivity and operational effectiveness.

MMM GRADUATE PROFILE

Strong undergraduate engineering or science background (industrial, mechanical, electrical, chemical, metallurgical, etc.), ideally suited for problem solving

An average of four years work experience in various aspects of manufacturing, logistics and supply chain

International background and a global perspective; mobile and adaptable

Professional, results-oriented team player with enhanced soft skills

With strong fundamentals in

- All facets of business and management (operations, marketing, accounting, finance, information systems, organizational behaviour, industrial relations, group dynamics, leadership, etc.)
- Business process flows
- Quantitative modeling, analysis and optimization
- Communication and presentation

And a profound knowledge of

- Logistics and supply chain operations
- Production strategies and operations
- Manufacturing technologies and automation
- Quality systems and management

Trained and highly qualified for

- Analyzing, planning and optimizing manufacturing and supply chain operations, processes and systems.

BENEFITS OF PARTICIPATION IN MMM

Students pursuing the MMM degree will realize numerous benefits during their studies as well as in their professional life upon graduation. Among others, they will be able to

- Prepare for a leadership role in manufacturing, supply chain and logistics operations
- Obtain specialized education at a prestigious university with world-class faculty
- Graduate after only 16 months with a skill set encompassing both management and technical aspects of business
- Deal directly with industry professionals in a hands-on, practical program and be exposed to the latest in operations innovation
- Implement real-time performance initiatives
- Translate a corporate operations vision into an action plan
- Enjoy the rewards of membership in the global and dynamic MMM community
- Embark on a path of continuous improvement and lifelong learning.

"In today's marketplace, building cars and trucks has become very competitive not only in terms of quality and cost, but also in finding the top management team with manufacturing experience to become leaders, coaches and trainers for the year 2000 and beyond. It is becoming very important that major universities such as McGill work with industry to help develop the product we need to become the very best we can be. The MMM program at McGill is truly the way to go to get universities on our manufacturing shop floors and to bring manufacturing people to the university."

Allan H. Rae

Senior Executive, Corporate Quality
DaimlerChrysler Corporation



Global Operations & Supply Chain

RÉSUMÉ

La rapidité des progrès technologiques et la mondialisation des marchés ont créé un nouveau milieu de travail. Les entreprises sont à la recherche de dirigeants capables d'établir des synergies entre les employés et les partenaires afin de créer de nouvelles perspectives professionnelles et de nettement rehausser la productivité et réduire les coûts.

Le programme Master in Manufacturing Management (MMM), ou maîtrise en gestion de la production (MGP), est une solution technique de rechange à un MBA avec une spécialisation en gestion des opérations. Il s'agit du seul programme d'études à temps plein de son genre au Canada. La mission du programme de MGP est de former des étudiants possédant des compétences intégrées en génie, gestion et leadership, spécialisés dans la fabrication, la chaîne d'approvisionnement et les opérations de logistique. C'est pourquoi le programme cherche à inculquer aux étudiants les compétences nécessaires pour faire face à l'évolution des besoins de l'économie mondiale.

Les facultés de génie et de gestion de l'Université McGill, avec le concours du secteur privé, ont créé le programme MGP pour répondre au besoin croissant de tels dirigeants. La participation de l'industrie et les interactions avec elle sont les principales caractéristiques du programme : des études de cas, des visites d'usines, des séminaires, des projets industriels et des stages sont organisés par les commanditaires et les partenaires du secteur privé. Cela permet d'avoir une compréhension globale des enjeux et des défis du milieu commercial d'aujourd'hui. Les objectifs principaux de ces activités de type professionnelles seront l'amélioration de la productivité et l'efficacité opérationnelle.



Global Operations & Supply Chain

PORTRAIT TYPE D'UN DIPLOMÉ DE MGP

Solide formation de premier cycle universitaire en génie ou en sciences: (Industriel, Mécanique, Électrique, Chimique ou Métallurgique), idéale pour développer l'aptitude à résoudre des problèmes.

Une moyenne de quatre années d'expérience de travail dans divers aspects de la fabrication, de la logistique et de la chaîne d'approvisionnement.

Formation internationale et perspective globale; flexible et mobile.

Des qualités de dirigeant, de l'esprit décisionnel et de l'habileté dans la résolution de problèmes, et des compétences en relations humaines

Avec des bases solides en:

- Gestion et en commerce (incluant notamment le marketing, la gestion des opérations, la comptabilité, la finance et le SI)
- Modélisation quantitative, analyse et optimisation
- Flux de production commerciale
- Communications

Une connaissance approfondie:

- De la chaîne logistique
- Des stratégies et des opérations de fabrication
- Des technologies de production et de l'automatisation
- Des systèmes qualité & de la gestion

Formé et hautement qualifié pour:

- L'analyse, la planification et l'optimisation
- La gestion de la chaîne d'approvisionnement
- Les opérations, les procédés et les systèmes de production

AVANTAGES POUR LES PARTICIPANTS

Les étudiants qui s'inscrivent au programme de MGP profiteront de nombreux avantages au cours de leurs études, ainsi que durant toute leur vie professionnelle après l'obtention de leur diplôme. Ils :

- Seront prêt à assumer un rôle de dirigeant des opérations de fabrication, de logistique et de la chaîne d'approvisionnement.
- Auront acquis une formation spécialisée dans une université prestigieuse au sein d'une faculté de renommée internationale.
- Obtiendront leur maîtrise après seulement 16 mois avec des compétences qui englobent à la fois la gestion et les aspects techniques des affaires.
- Entretiendront des rapports directs avec des professionnels de l'industrie et seront initiés aux toutes dernières technologies industrielles;
- Seront en mesure d'intégrer des initiatives de performance en temps réel
- Transformeront une vision corporative des opérations en plan d'action.
- Bénéficieront des avantages de l'appartenance à la grande famille dynamique de la MGP;
- Amorceront un cheminement de perfectionnement permanent et d'acquisition continue du savoir.

"Le programme MMM offre une brochette de cours conçus par des experts en gestion, en génie et en fabrication qui, ensemble, travaillent à préparer les futurs chefs d'entreprises. Dans le cadre de leur programme, les participants sont exposés aux meilleures pratiques existant dans nos entreprises pour qu'en relation avec les sujets offerts par la faculté lors des cours, on puisse leur procurer une appréciation sur-le-champ des défis que nous rencontrons en milieu industriel, et leur offrir l'opportunité de venir faire la différence. Nous souhaitons longue vie au MMM!"

P. Michel Gagné

Directeur Ressources Humaines
Pratt & Whitney Canada Inc.

GRANDESCUNT AUCTA LABORE BY WORK, ALL THINGS INCREASE AND GROW.

McGill University is recognized worldwide for its high standards in teaching, research and scholarly achievement. Founded in 1821, the main campus of one of North America's oldest and most prestigious universities is located on 80 acres in downtown Montreal. Twelve faculties and a number of professional schools offer undergraduate degrees in some 300 disciplines. Graduate studies include 250 master's, doctoral, diploma and certificate programs in more than 85 fields of study. Considered one of the most internationally active and respected educational institutions in the world, McGill boasts international projects worth over \$50 million.

Over the years, McGill has been awarded 163 Canada Research Chairs, representing over 12% of its full-time tenured faculty. Six of McGill's professors and graduates have received the Nobel Prize while 125 students have been awarded the prestigious Rhodes Scholarship - the most of any university in Canada. Approximately 180,000 McGill graduates live and work in 155 countries around the world. They are linked to the McGill Alumni Association through 100 branches worldwide: www.mcgill.ca/alumni-branches/.

McGill has an enrollment of approximately 33,000, including over 7000 graduate students. Currently 18% of undergraduate and 25% of graduate students are international. The university provides a variety of services and activities, among them, career and placement, off-campus housing, health, counseling, chaplaincy, athletics, several newspapers, a community radio station, over 100 clubs, societies and associations. There are theaters and concert halls, museums, a student center, the Post-Graduate Students' Society (PGSS) and the International Student Advisor's Office.

McGill's 14 libraries and two reading rooms contain more than five million books and journals in traditional and online format. For the most part, MMM students use the resources of the Howard Ross Management Library and the Schulich Library of Science and Engineering. Moreover, a definitive collection of books and periodicals on manufacturing management has been established: www.library.mcgill.ca/pse1/subguide/manufact.htm.

Information Systems and Technology (IST) is responsible for McGill's computing and communications infrastructure and the central systems that depend on it. Network and Communications Services (NCS) is the IST unit that operates the university's optical backbone network and manages Internet access, Dial-up Access Service (DAS) and McGill's Virtual Private Network (www.mcgill.ca/ncs). There are more than 30 separate computer laboratories that are located and managed by faculties and departments across the campuses. MMM students avail themselves mostly of the MBA Computer Labs in the Faculty of Management and the McCAD Computer Lab and the Machine Tool Lab in the Faculty of Engineering.

"McGill is ranked the top Canadian school in the ranking of the world's best universities and the only Canadian university in the top 25 in the world."

The Times Higher Education, November 2007

"The MMM Program provides a win-win solution for both industry and students. It satisfies industry needs of having specialized professionals to help in improving their competitiveness in the ever-changing global market, and it offers students great opportunities for really valuable industrial experience throughout the whole program."

Yan Yan (Brenda) Hu, MMM'01
President
Tonyda High-Tech Inc., China

"Getting a good job in a new country is always a challenge. I had apprehensions about my career when I moved to Canada from India and joined the MMM program. But the value addition in my knowledge, which I got from this program, was immense and helped me get a position as plant manager for GE-Hitachi Canada. The manufacturing industry now needs more "system thinkers" who can drive waste out from the whole value stream. The MMM program helped me equip with the tools needed to succeed in today's global manufacturing environment."

Gurmeet Singh Guliani, MMM'05
Plant Manager
GE-Hitachi Canada



Multicultural Montreal is a beautiful, ethnically-diverse and cosmopolitan urban center. Often described as the Paris of North America, it offers a unique blend of a modern, North American lifestyle and a delightful European charm. Most of its inhabitants are bilingual: English and French. The city is renowned for its excellent public safety record and public transportation system as well as its high standard and low cost of living.

Montreal hosts a myriad of cultural, sports and leisure activities. Because McGill University is located in the heart of downtown Montreal, students have easy access to shopping facilities, sports complexes, concert halls, museums, cinemas, places of worship, office buildings and restaurants. The city is famous for its fine food, entertainment and nightlife. A network of underground corridors links many buildings with the Metro, Montreal's outstanding subway system, and provides a warm ambiance during the winter months. Very international in its outlook, the city was host to the World's Fair in 1967 and the Olympic Games in the summer of 1976. Montreal is also renowned for its world-class festivals: jazz, film, comedy, fireworks, food and new age cinema.

The city is home to four universities, with a student population of over 145,000, and several private and government industrial research centers. It is the location of numerous head offices in industries such as electronics, aerospace, telecommunications, pharmaceuticals and biotechnology. According to Statistics Canada, Montreal ranked fourth in Canada in 2007 among cities with the greatest number of jobs in the high-tech sector.

Montreal's inhabitants are fortunate to experience four true seasons. Climate ranges from 32°C (90°F) as a daytime high in mid-July to -20°C (-4°F) in mid-February. Average annual precipitation includes 78 cm (31 in) of rain and 242 cm (95 in) of snow.

For several years the United Nations has deemed Canada as one of the best countries in the world in which to live. Students who arrive in Montreal can enjoy the experience of a lifetime. Not only does Montreal offer numerous attractions, it is also one of the most affordable major cities in the world.

Detailed information on Montreal is available on the following websites:

www.montreal.com
www.tourisme-montreal.org
www.ville.montreal.qc.ca

"McGill and Montreal offer an irresistible combination of a university with a reputation as the Harvard of Canada in a city known as the Paris of North America."

The Globe and Mail, October 2006

"The practical focus of the MMM program is the most useful. Case studies and seminars help you get close to real-life manufacturing management. The internship is the most exciting part of the program; you are given a problem and you have to provide a feasible solution. Every day is a challenge. You have to see the big picture and foresee the possible pitfalls. It is here that all the courses and theory come together with real life."

Jesus Zepeda, MMM'01
Project Manager
COMEX, Mexico



The MMM program is unique for its intensity, industry collaboration, intended skill set, and the international composition and outlook of all participants.

One of only a few similar programs in the world, MMM aims to develop individuals with **integrated skills in management, engineering and leadership**. Heeding the voice of industry, the program provides a professional, hands-on approach which addresses all major issues germane to the design, planning and management of operations: manufacturing and supply chain strategies, product and process design, process analysis and management, inventory, quality and capacity management, supply chain design and management, logistics, information technology and E-commerce, organizational relations, marketing and delivery to the customer. **The focus is on all facets of supply chain, logistics and manufacturing management.**



An important distinguishing feature is the amount of **involvement by corporate sponsors** who interact with students and faculty throughout the year and provide the vital practical component of MMM. In a dynamic collaborative effort, sponsor and partner companies participate actively by contributing to program design, case studies, seminars, plant tours, workshops, student projects and work terms. By means of direct involvement with industry representatives, MMM students have the ability to profoundly comprehend the intricacies of today's operations environment as well as avail themselves of valuable networking opportunities. Those students who demonstrate the skill set required by company recruiters may be placed on the fast track to management status.

Graduates of the MMM program have established a very active and ever-expanding **MMM Alumni Society**. Its members provide assistance with industry courses, organize numerous activities, offer networking opportunities, benchmarking and workplace feedback. Alumni members may be contacted at mmm.alumni@sympatico.ca.

Another defining feature is the very high **international composition** - over 50% of the MMM student body and faculty originate outside of Canada. As a result, the program provides the opportunity for studying business issues on a global scale, for comparing systems and operations in numerous countries worldwide, as well as for international networking. Special focus is placed on global supply chain management and manufacturing and the need to be entrepreneurial in a constantly changing and internationally competitive marketplace.

The **MMM full-time program** is offered over a twelve-month academic term at McGill University and a minimum four-month work term at an industry location. The program is highly intensive with 18 courses in three consecutive semesters. Classes start in September and end the following August. The work term usually begins either at the end of August or beginning of September. Upon successful

completion of all program elements, a Master of Management degree is bestowed on MMM graduates.

The MMM program can also be followed on a **part-time basis** by individuals living and working in the Montreal area. Most classes are offered in the evening to accommodate their schedules. For the work term portion of the program students may undertake a project assigned by their company. The part-time MMM program may be completed between three to five years.

"As one of the first part-time participants, the MMM program has allowed me to understand manufacturing in a more complete orientation, a solid grasp of business and plant management issues. The participation of corporate sponsors has made this program quite innovative. It has opened my eyes to a variety of possible challenges and has created many new professional career opportunities. MMM is a specialized business degree for those who look to progress in the manufacturing industry."

Jean Coupal, MMM'01
VP Operations
Venmar Corporation

"I have been associated with the MMM program for some years now and have received opportunities to not only improve my business through seminars and conferences, but also through student internships and potential for long-term educational opportunities for my employees. The curriculum in this program is cutting edge. I can honestly say that I wish I had the opportunity to attend a program like this 15 years ago."

Thomas Despres
Plant Manager
Astec APS, Mexico

"I am presently working at a consulting company in Spain. The MMM program has provided me with an understanding of all the factors (money, people, technology, management, ecology, quality, strategy, etc.) required to make appropriate recommendations to client companies. I am more open-minded and I approach the problems with greater facility than ever before."

Mikel Iria, MMM'99
Operations Consultant
LKS Consultores, Spain

"In today's manufacturing environment, the inability of engineers and managers to communicate on the same wavelength poses immense problems. The MMM Program helped bridge that goal ambiguity for me and it taught me to visualize the intangibles which hard-core engineers tend to overlook. The program taught all of us to devise localized key performance indicators in response to a global goal, in other words, to quantify and localize global goals to be well communicated and understood on the production floors. It gave us a vision of the dynamics of manufacturing systems and opened up the possibilities of becoming the manufacturing/ operations strategists and visionaries of the future."

Sohaib Akbar, MMM'00
Project Manager
JDS Uniphase

The positions obtained by MMM alumni upon graduation depend on a variety of factors, including prior experience, soft skills, industry standing, company situation, personal interests and aspirations. The following is a sampling of currently-held positions.

- Business Systems Analyst**
- Business Unit Manager**
- Consultant**
- Customer Service Center Manager**
- Director of Engineering**
- Global Quality Manager**
- Inventory Analyst**
- Labour Health & Safety Manager**
- Manufacturing Engineer**
- Optimization Planning Analyst**
- Plant Manager**
- Process Engineer**
- Process Improvement Specialist**
- Production Manager**
- Project Manager**
- Quality Assurance Specialist**
- Strategic Sourcing Analyst**
- Supply Chain Coordinator**
- Supply Logistics Manager**
- Supply Management Specialist**
- VP Operations**

The following is a list of some of the companies where MMM alumni have held permanent positions:

- 3M Canada**
- Accenture, China**
- Algoma Tubes**
- Allied Technologies, Pakistan**
- AP Technoglass, USA**
- Benteler Automotive**
- Canadian National Rail**
- CEPSA, Spain**
- COMEX, Mexico**
- C.R. Bard, USA**
- DaimlerChrysler Corp., Thailand**
- Draxis Pharma**
- Dynacast Canada**
- Ericsson Canada**
- Fluor Daniel Canada**
- Gaz Metropolitan**
- GE Hydro**
- General Motors Corporation**
- Giga Information Systems, Taiwan**
- Hanscomb Global Performance, Russia**
- John Deere Corporation**
- Kraft**
- Kruger**
- Kuwait Petroleum Corporation**
- LKS Consultores, Spain**
- L'Oreal**
- Maple Leaf Foods**
- Mars Inc., Dubai**
- Ministry of Science & Technology, China**
- Novellus Systems, USA**
- Pratt & Whitney Canada**
- Rogers Communications**
- Rolls-Royce Canada**
- Royal Victoria Hospital**
- Schlumberger**
- Singapore International Airlines**
- SNC Lavalin**
- Telus Mobility**
- United Technologies Corp., USA**

Placement Statistics

	% of Graduates
Production Operations	45%
Logistics & Supply Chain Management	30%
Consulting	13%
Entrepreneurship (own business)	4%
Other Industries	8%
Starting Salary Range	\$60-\$80,000

The MMM curriculum is a unique combination of intensive academic and practical studies, which provide the skill set required by corporations with extensive and sophisticated operations. The 18 academic courses plus the industrial project (56 credits) span a number of categories, each serving a different objective. Together they provide the necessary qualifications for a career in manufacturing and supply chain management.

The courses on general business and management skills encompass business fundamentals, people skills and management, quantitative modeling and optimization. Courses on manufacturing and supply chain operations focus on the development of operations strategies and the management of operations systems. Courses on manufacturing and technology analyze production processes and technologies, issues associated with design and new product introduction, and the impact of information technology. In most of these courses, students have opportunities to work on projects in teams, improve their ability to solve real

problems, develop experience with computer systems, and understand the human and environmental factors in management initiatives. Industry courses (seminars, case studies, work terms) are the real-time, practical content offered directly by corporate personnel. Professional development focuses on communication, group work, business etiquette and corporate culture.

Part-time students may be able to complete the program within three years by taking two courses each semester and by working on their industrial project during the last year. To demonstrate the feasibility of such an undertaking, a sample part-time schedule has been formulated and may be viewed on the MMM web site.

The language of instruction at McGill University is English. However, term papers and examinations may be submitted in either English or French. Courses are graded on the North American graduate system where a passing grade is 65% (B-).



MMM students with Professor Vince Thomson in the robotics laboratory.

MMM	FALL SEMESTER	WINTER SEMESTER	SUMMER SEMESTER	FALL SEMESTER
GENERAL MANAGEMENT	<ul style="list-style-type: none"> ■ Managing Resources (Human + Financial) ■ Value Creation (Supply + Demand Management) 			Work Term or Industrial Project
REQUIRED	<ul style="list-style-type: none"> ■ Data, Models & Decisions ■ Product Design* 	<ul style="list-style-type: none"> ■ Logistics Management ■ Total Quality Management ■ Computer Integrated Manufacturing ■ Operations Analysis 	<ul style="list-style-type: none"> ■ Strategic Management of Operations ■ Discrete Manufacturing Systems* 	
ELECTIVES	<ul style="list-style-type: none"> ■ Cross-cultural Management ■ The Art of Leadership 	<ul style="list-style-type: none"> ■ Managing Teams in Organizations ■ Managing Organizational Change ■ Managerial Negotiations 	<ul style="list-style-type: none"> ■ Industrial Relations ■ Manufacturing & the Environment ■ Procurement & Distribution 	
INDUSTRY	Industrial Seminars, Manufacturing/Supply Chain Case Studies			
PROFESSIONAL DEVELOPMENT	Leadership, Business Etiquette, Business Presentation Skills, Project Management, Lean Thinking, CV writing and Interview Techniques, Networking Strategies			

*For students in the Process option, these courses may be substituted by Chemical Reaction Engineering and Small Computer Applications in Chemical Engineering.

MMM Program Directors

Vince Thomson

Werner Graupe Professor of Manufacturing Automation
 Department of Mechanical Engineering
 B.Sc., University of Windsor, Canada
 Ph.D. (Physics), McMaster University, Canada

Dr. Thomson has been involved in manufacturing and information technology related research for the past 25 years at McGill University and the National Research Council (Canada). He is the founder and co-director of the Master in Manufacturing Management program at McGill. His research has ranged from shop floor control and production scheduling to the present interest in realtime control and process management in manufacturing. His process management research has focused on new product introduction, concurrent engineering and manufacturing support in terms of coordination, metrics, and process principles.

Saibal Ray

Co-Director, MMM Program
 PhD, University of Waterloo

Dr Ray's teaching interests are in the areas of Operations Research and Operations Management. His current teaching activity is the Operations Management course at the undergraduate level and Manufacturing Strategy in the Master in Manufacturing Management Program. Management and coordination of supply chains, time-based competition, inventory and lead time planning models for production and distribution systems, and joint operations and marketing decision making are Dr Ray's primary research interests. His current research focuses on optimal supply chain design (e.g., lead time, investment, inventory) for firms under price and service sensitive demand. Dr Ray is a member of the Institute for Operations Research and the Management Sciences (INFORMS), Canadian Operational Research Society (CORS) and IIE (Institute of Industrial Engineers).

MMM Faculty

Sample list of current MMM Professors:

Helmi Attia, Ph.D.,
 McGill University

Tamer Boyaci, Ph.D.,
 Columbia University

Sandra Cha, Ph.D.,
 Harvard University

Louis Gialloreto, MBA, LLM,
 McGill University

Larbi Hammami, M.A.,
 Wharton School, University of Pennsylvania

Phil Levy, MBA,
 McGill University

Shanling Li, Ph.D.,
 University of Texas at Austin

Karl Moore, Ph.D.,
 York University

Angelo Segall, MBA,
 University of King's College

Vedat Verter, Ph.D.,
 Bilkent University, Turkey

"After graduation, our students are adapted to the realities of globalization and immediately ready to tackle some of manufacturing's difficult problems: close competition, extremely short product life cycles, increased use of technology, world-wide supply chains and complex manufacturing strategies. Our engineers are in a position to work effectively with others to solve the challenges facing today's manufacturers."

Professor Vince Thomson
 Program Co-director

MMM Executive Committee

Prof. Christophe Pierre,
 Dean, Faculty of Engineering

Prof. Peter Todd,
 Dean, Desautels Faculty of Management

Dr. Arun Misra, Chair,
 Department of Mechanical Engineering

Professor Vince Thomson,
 Faculty of Engineering

Professor Saibal Ray,
 Faculty of Management

Ravi Samuel,
 Manager, Quality, Technology &
 Product Engineering,
 3M Canada

Judson Kenney,
 Business Unit Manager,
 Pratt & Whitney Canada

John Glavas,
 General Manager, Non Sterile Business,
 Draxis

Michael Avedesian,
 Office of Technology Transfer,
 McGill University

"MMM program efficiently combines a mix of Engineering curriculum and graduate-level management courses to give its students the right skill-sets to perform in today's continuously changing manufacturing environment. The specialized seminar based training programs in Six Sigma and Leadership further add to the usefulness of hiring MMM students as from the company's perspective they can hit the ground running and quickly integrate within the company's management system. The mandatory paid internship aspect of the program further increases the employability of the students and also gives a chance to experience the Canadian work-culture."

D.M.G., MMM'08
 Oil Industry
 Canada

Current opportunities and challenges for corporations have resulted not only in the adoption of sophisticated technologies, but also the expansion of global markets, powerful changes to corporate structure, and an extremely competitive marketplace. Present-day focus is on supply chain management, lean manufacturing, six sigma, JIT, logistics and similar concepts. Such revolutionary changes have resulted in a new workplace, and companies in the contemporary economy are seeking future leaders for their operations. They require agents of change who understand the critical factors in an improvement initiative and can create and enhance high-performance systems.

Recognizing the growing need for skilled individuals who are well versed in technical, business and people issues, MMM sponsors and corporate partners participate actively in the program and provide a variety of services to students. They work closely with MMM faculty and administrators in shaping the structure and content of MMM. For the duration of the program, students spend a significant portion of their time directly involved in industry projects and activities.

Seminars are organized with industry experts and practicing managers to provide information on recent trends, issues and challenges. The seminar topics and speakers are carefully chosen to complement issues covered in the academic courses.

Case Studies are hands-on problem solving exercises carried out in a real industrial setting. Students study the case in detail and are expected to propose solutions after thoroughly researching all aspects of the given problem and participating in brainstorming sessions.

Course Projects are required elements in some of the academic courses. Typically they are studies of present or historical activities, or problems into which companies would like some insight, analysis or proposed solutions. Teams of two to four students spend about 20 to 40 hours each on research and compilation of reports.

Plant Tours provide MMM students with the opportunity to visit sponsor or partner firms and to observe first-hand their manufacturing and logistics facilities. Excursions to companies in the Montreal area are organized throughout the year. For companies in other parts of Canada multi-plant tours on trips of several days are organized in the fall and spring.

Conferences on the broad issue of supply chain management are sponsored annually by the MMM program, in conjunction with the Management Science Research Centre (MSRC). Invited speakers share the results of their research experience and expert wisdom with students and other corporate representatives.

- 2005 Management Best Practices
- 2006 Managing the Cost of Quality in the 21st Century
- 2007 Trends and Best Practices in Outsourcing
- 2008 Risk Management in a Global Environment

Industry Work Terms (internship or stage) are an integral component of the MMM program. Their objective is to provide an opportunity to see the operation of a manufacturing or logistics organization, and to get a wide view of how various principles are put into practice on a daily basis. The work term provides exposure to the high level of professional skills needed for operations management and represents a practical implementation of topics in university courses.

Each work term is centered around a project decided by mutual agreement between the candidate, the participating company and the course professor. The evaluation of the student's performance during the internship is performed by his or her immediate industrial supervisor. The completed project is evaluated by a faculty member. A presentation on the project is given by the student upon completion and a detailed report is submitted to both industry and faculty supervisors. A work term can be of any length agreed to by the student and the company. For academic purposes the student is evaluated after four months and a mark is assigned; the student then graduates irrespective of the length of the work term.

The course professor and the MMM program coordinator organize those work terms offered by sponsoring companies. Many internships are located by the students themselves. Candidates for these work term projects follow a procedure which is very similar to the job-seeking process of application - interview - offer - negotiations - employment contract. MMM students are also free to accept full-time employment upon completion of their academic courses. In such cases, their first project will qualify for the work term requirement. Salaries depend on the degree of difficulty of the project, budgetary considerations and on prior experience. The work term is the practical culmination of the MMM program. To date, almost 60% of MMM students have received permanent job offers from their internship hosts. If, for any reason, students do not succeed in locating a work term, a research project will be substituted.

MMM Sponsors:

**3M Canada
MMM Named Sponsor**

Consumer Products

**Pratt & Whitney Canada
MMM Sponsor**

Turbine Engines

Sample Case Studies:

Aerosols Inventory Optimization
3M Canada

Demand Forecasting & Capacity Planning
CAE Inc.

Reducing Cycle Time for Circuit Board Manufacturing
Celestica

Improving MRO Inventory
General Electric

Scorecard for Supply Chain Management
IBM Canada

Study for a New Mines Communication System
INCO

Study of Growth Industries for Possible Investment
Kruger Inc.

Improving the Quality of Shipment Processes
Liberty Foods

Determining Critical Characteristics of the World's Best-in-class Manufacturing Companies
LKS Consultores, Spain

Strategies for Global Pharmaceutical Manufacturing
Merck Frosst

Reduction of OEM Inventory
Pratt & Whitney Canada

Cost-effective Methods for Disposing Biological Solids
Tembec Inc.

Metrics for Operations Performance
Thomas & Betts

New System for Reverse Logistics
Venmar Ventilation

Sample Work Terms:

Waste Reduction in Tape Manufacturing - a Six Sigma Approach
3M Canada

Implementing a Plant Scheduling System
Algoma Tubes

Outsourcing in China for Design, Quality and Manufacturing of Medical Products
AMG Medical Inc.

Re-engineering the OEM Procurement Process & Optimizing Material Flow in a Mexican Plant
Astec APS

Improvements to the Process of Material Movement from Stores to Cells
CAE Inc.

Cycle Time Reduction in Circuit Assemblies for OEM Customers at LACFT Facilities
Celestica

New Strategies for a Continuous Improvement System in the Area of Safety
CEPSA, Spain

Lead Time Reduction on a Manufacturing Line under a CONWIP Environment
C.R. Bard, USA

Automating Purchasing through a Web Application
General Electric

Phased Implementation of Lean Manufacturing Concepts and Practices at Four Locations
General Electric

Capital Investment Model for Total Cost of Ownership
Gennum Corporation

Implementing a Supply Chain Scorecard
IBM Canada

Improvement of Reverse Logistics
JDS Uniphase

Developing Tactics for LCC Strategic Sourcing and Procurement
Kruger

Re-engineering of Corporate Standard Process for NPI
Nortel Networks

Process Improvement at the Infertility Clinic
Royal Victoria Hospital

Strategies for Common Stock Materials
Schlumberger USA

Sample Seminars:

Bonding Solutions for Manufacturing Processes
3M Canada
 Greg Doyle,
 Technical Service Manager

Project Management
Accenture
 Basil Yunan, Partner

Product/Process Innovation
CAE Inc.
 John Overton,
 Manager Manufacturing Systems Engineering

Deployment of Product Data Management Systems
CMC Electronics
 Patrick Champagne,
 VP Engineering

The Chrysler Operating System
DaimlerChrysler Corporation
 Allan Rae, Manager COS

GE's Six Sigma Initiatives
General Electric
 Lawrence Seybold,
 Manager Engineering

Critical Issues in Manufacturing vs. Outsourcing
Gennum Corporation
 Gora Ganguli,
 VP Operations

Building the On-Demand Supply Chain
IBM Canada
 David Swiggum, Director NA Customer Fulfilment

Telemining - INCO's Innovative Concept of Automated Mining
INCO
 Greg Baiden,
 Manager Mines Research

Value Improvement at John Deere Welland Works
John Deere Corporation
 Michael Sudah,
 Production Supervisor

Lean Journeys at High Performance Unionized Facilities
Korex Don Valley
 Steven D. Little,
 Business Unit Manager

POUPOS - a Web-based Supply Chain Application
Nortel Networks
 Olivier Fichet, Project Manager

Achieving Competitive Excellence
Pratt & Whitney Canada Inc.
 Katherine O'Flaherty,
 Maintenance Manager, & Team

Risk Management in Global Business
Tembec Inc.
 Frank Dottori, President & CEO



MMM students dressed in safety equipment before a tour of INCO's Froid-Stobie Mine in Sudbury, Ontario, Canada.

To be considered for admission to the MMM program, candidates should possess the following qualifications:

- An undergraduate degree in engineering or science, with a minimum CGPA of 3.0 out of 4.0. Two official transcripts of marks must be sent to the MMM Admissions Office directly from all universities attended. If in a language other than English, official translations must be submitted bearing the actual signature of the registrar and official seal or stamp of the institution.
- Full-time work experience of at least two years in some facet of operations. Details of this experience should be comprehensively described in a curriculum vitae. Those with less experience may receive authorization to enter the program as each applicant is considered on a case-by-case basis.
- A minimum GMAT score of 570 or a minimum GRE score of 1150 on the verbal and quantitative sections and at least a 4.0 on the analytical writing section of the GRE exam. Scores are to be forwarded by ETS to the MMM Admissions Office (institution code 0935; department code 4201). For complete details, visit www.gmat.org or www.gre.org
- A minimum score of 600 (paper-based test) or 250 (computer-based test) on the TOEFL, to be submitted by ETS on behalf of international applicants to institution code 0935, department code 02. Details are available at www.toefl.org. The MMM program reserves the right to reject any candidate who does not demonstrate the ability to speak, write and comprehend English.
- Evidence of communication, teambuilding and leadership skills. These can be described in the two required letters of recommendation. Program directors interview all prospective candidates to determine their potential in these areas.

Students interested in applying are encouraged to do so online by visiting <http://www.mcgill.ca/mmm/admission-application/process/>. Here applicants have to complete both the McGill University Graduate On-line Application and the MMM Admission Booklet.

A limited number of candidates holding other degrees and relevant work experience may be considered for admission to MMM on a case-by-case basis. Those who do not have an undergraduate degree in engineering may be required to take supplementary courses specified by the program directors. Each application will be analyzed in detail and a determination made as expediently as possible.

Deadlines

All candidates are encouraged to apply early to ensure a place in the program, particularly international applicants who require a student visa.

The deadline for International students is March 15.

The deadline for Canadian students is May 15.

Who Should Apply?

Students contemplating admission to the MMM program should consider how positively they can relate to a number of issues:

- Aiming for a career in operations
- Strong aptitude for leadership, decision-making and problem-solving
- Fascination with operations systems, strategies and technologies
- Contributing to the effective management of an organization
- Enhancing existing soft skills
- Expanding current industrial experience
- Involvement in the international aspects of operations
- Fulfilling the necessary admission requirements.

"Being the first non-engineering-background student enrolled in the program, I truly believe that the MMM program gave me the extra competitive edge over business or MBA students in manufacturing-related careers. The internship in Mexico gave me a more global view and an ability to work in a cross-functional and cross-cultural environment."

David Kuo, MMM'00
Sales Manager
Lien Mou Industries Ltd., Taiwan

International Students

A large percentage of the MMM student body is composed of international students. Those who are accepted into the MMM program are subject to visa entry requirements and in their admission package receive the "Getting Started" pamphlet which is a very good summary of immigration procedures. In order to study at McGill, international applicants must apply for permission from two levels of government. The first is Immigration Quebec which issues the Certificate of Acceptance of Quebec (CAQ). The second is the Department of Citizenship and Immigration Canada which issues the Student Authorization. Since acceptance into the MMM Program is mandatory for initiating the visa application process, international candidates are urged to submit their applications as early as possible. It is very important that applications are complete and include all supporting documentation so that an acceptance letter can be sent out promptly. To allow adequate time for processing and receiving a student visa, international students should begin the visa application process as soon as they receive their letter of acceptance from the Graduate and Postdoctoral Studies Office. Depending on the part of the world in which they are living, applicants may require anywhere from three to six months to complete the process. International students can only be registered on a full-time basis for study at McGill.

Students from outside Montreal who join the MMM program can obtain assistance in locating appropriate housing through the International Student Coordinator in the Faculty of Management. The International Student Services (ISS) office provides a wide range of services which include immigration information, the Buddy Program, transfer of funds, health insurance, living in Montreal and much more. ISS also publishes the International Student Handbook which can be consulted and downloaded from their web site. Further information is available at ww2.mcgill.ca/stuserv/iss/intlstud.htm. E-mail: international.students@mcgill.ca. Students should also visit www.music.mcgill.ca/misn/, the web site of the McGill International Students Network.

Class Profile

Average class size	15
Average age	27
Average years experience	4.3
Average GMAT	663
Average GRE	1350

Tuition Fees

The MMM program is entirely self-funded without the benefit of government subsidies. Tuition for the 16-month program is C\$29,000 for all students, Canadian and international. Fees are paid per session according to the number of credits a student is taking. In addition there are approximately \$2000 in student services fees. These include compulsory health insurance coverage for international students.

Living Expenses

Montreal enjoys one of the lowest costs of living of any North American city. The following is an estimate of living expenses in Canadian dollars for a single student studying full-time for a 12-month period:

Books and supplies	\$1,500.00
Apartment rent, utilities and food	\$12,000.00
Transportation, if necessary	\$780.00
Winter clothing, if necessary	\$500.00
Total:	\$14,780.00

Additional funds are required for sports, leisure and cultural activities.

Werner Graupe Memorial MMM Fellowship

This fellowship was established in 2001 by the MMM program in memory of Werner Graupe, a long-standing supporter and friend of the University. It is awarded by the MMM fellowships committee to graduate students registered in the program. In addition to strongly meeting all admission requirements, candidates must be Canadian citizens or permanent residents and must demonstrate fluency in French and English. Priority is given to full-time students; part-time students are considered for partial awards in the absence of full-time awardees. The value of the full award is C\$20,000.

The J. Keith Drysdale Fellowship

The Drysdale Fellowship recognizes and promotes the academic achievement of the top graduate student in the MMM program. It will be awarded to a current student in August of each year upon completion of all course work. Value: C\$5,000.

Entrance Scholarships

A limited number of entrance scholarships funded by the program's corporate sponsors are awarded to top applicants every year. These are:

Two **3M Entrance Scholarships**, valued at C\$14,500 each
Up to 5 entrance scholarships at C\$5,000; one of which is the **Pratt & Whitney Canada Entrance Scholarship**.

Each candidate accepted to the program is automatically considered by the MMM Admissions Committee for an entrance scholarship

Performance Scholarships

Because this is a professionally-oriented program and all efforts are made to emulate a corporate environment, MMM distributes performance scholarships during the course of the academic year. Closely resembling corporate bonuses, three such scholarships valued at C\$1500 each are available in the form of tuition reduction to the three most-qualified students after each academic semester. In addition, a scholarship of C\$1500 is also awarded after the second and third semesters to the most improved student.

Other Scholarships

To assess eligibility for additional awards, Canadian students can contact the Fellowships and Awards Coordinator in the Graduate and Postdoctoral Studies Office at McGill University.

Web site: www.mcgill.ca/gps/fellowships.
E-mail: graduate.fellowships@mcgill.ca

International students can apply for scholarships either offered in their own countries or by several multi-disciplinary programs specifically aimed at funding study in Canada by students from abroad. Applications for these programs must be made through the government of the applicant's home country, usually via the Ministry of Education. Information is available from the International Council for Canadian Studies.

Web site: www.iccs-ciec.ca.
E-mail: general@iccs-ciec.ca

For additional information about scholarship possibilities, International students should also consult a brochure entitled "Study in Canada" published by the Canadian Bureau for International Education.

Web site: www.cbie.ca



MMM students in Professional Development

Student Loans

A tuition loan plan for both Canadian and international students in the MMM Program can be negotiated with a financial institution in Montreal. Arrangements for loans are made directly between the student and the financial institution, subject to its loan process. Each student's request will be evaluated on a case-by case basis as to creditworthiness, but loans cannot be extended on personal security only. Both Canadian and international students require a co-signer who is a Canadian resident, working for a minimum of two years, has a good credit history, and can financially accept responsibility for the debt. International students can set up the loan before coming to Canada by contacting a bank in their country, referring to a loan under the MMM program, and having their bank set up the loan with the bank here, as long as they have a Canadian co-signer who meets the requirements.

Assistantships

Teaching and research assistantships in both Engineering and Management are available to all students. Applications must be made in person to the appropriate departments or professors. However, students are cautioned that part-time employment is not recommended because of the high workload of the MMM program.