

NSERC Investments

# Manufacturing

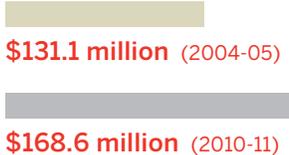


## \$168.6 million

NSERC Investments in Manufacturing (2010-11)

## \$1 billion

Government of Canada Investments through NSERC (2010-11)

**NSERC  
Investments in  
Manufacturing**

 \$131.1 million (2004-05)

\$168.6 million (2010-11)

The Natural Sciences and Engineering Research Council of Canada (NSERC) is a federal agency that helps make Canada a country of discoverers and innovators for all Canadians. NSERC maximizes the value of the Government of Canada's investments in research by promoting **research-based innovation**, university-industry partnerships and the **training of people** with the scientific knowledge and business skill set to create wealth from **new discoveries in science and engineering**.

Advanced research opens up new opportunities for transforming materials and substances into innovative high-value products and for greening manufacturing processes. That's good news for Canadian manufacturers who have seen many of their traditional material cost and production advantages disappear in the face of global competition. Increasingly, manufacturers are turning to partnerships with the knowledge sector and NSERC, not just for innovative ideas and improvements, but for the human talent that will sustain the renewal of their companies and the Canadian manufacturing sector.

### \$816.6 million

NSERC Investments in all Priority Areas of Canada's S&amp;T Strategy (2010-11)

#### Breakdown of Investments

- 1 | Information and Communications Technologies  
22%
- 2 | Manufacturing  
21%
- 3 | Health and Related Life Sciences and Technologies  
21%
- 4 | Environmental Sciences and Technologies  
18%
- 5 | Natural Resources and Energy  
18%



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# Manufacturing



## Impact and Investments

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### Smart Machining for Aircraft and Other Components

Canada's leading manufacturing researchers have set their sights on developing the world's most advanced virtual machining technology.

Their goal is nothing less than a complete set of modelling and analysis tools that will let manufacturers plan optimal machining in a virtual environment. The expected benefits include the more economical and energy-efficient manufacture of products, with no need for costly physical trials. Led by University of British Columbia mechanical engineer Yusuf Altintas, NSERC's multidisciplinary Canadian Network for Research and Innovation in Machining Technology includes 20 professors and their students from universities in four provinces. They work with a broad spectrum of industry and government partners that include ASCO Aerospace Canada, ATS Automation, Bombardier Aerospace, Memex Automation Inc., Origin International Inc., Pratt & Whitney Canada, Promotion Engineering Ltd., Sensor Technology Ltd., National Research Council Canada, and Natural Resources Canada's CANMET. NSERC is contributing **\$5 million** over five years to the initiative, with industry and universities adding **\$2.6 million** in contributions.

### Ramping Up Production of Biopharmaceuticals

University of Manitoba microbiology professor Michael Butler is leading an NSERC Strategic Network that will develop methods for the production of biopharmaceuticals that target diseases such as cancer, rheumatoid arthritis and coronary disease.

Therapeutic monoclonal antibodies, known as Mabs, are in such demand that global sales jumped from \$300 million in 1997 to \$35 billion in 2009. Given the global importance of Mabs, it is vital that Canada maintains a stake in the industry. The Canadian network, MabNet, initially involved 20 professors based in nine Canadian universities in collaboration with 12 Canadian companies and three government institutions. Compared to traditional chemical-based drugs, biopharmaceuticals are more difficult to produce in large quantities. With support from NSERC, the Network is studying ways of producing Mabs efficiently and consistently from the growth of mammalian cells in culture. NSERC's contribution to the five-year initiative will reach **\$5 million**, with contributions from partnering federal agencies and the private sector adding **\$2.2 million**.

**1,930**

NSERC-funded Professors

**430**

Industrial Partners

**\$29.7 million**

Industrial Contributions

**4,791**

NSERC Awards to Students and Fellows

**191**

NSERC-supported Research Chairs

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**"NSERC has been with us every step of the way and has played a key role nurturing the fundamental science, skilled talent and real-world innovations that give Integran its edge."**

**Gino Palumbo**  
Chief Executive Officer  
Integran Technologies Inc.

# Manufacturing



## Powertrain Boost for Canada

When Ali Emadi accepted an invitation to relocate from the Illinois Institute of Technology to McMaster University, Canada's research into hybrid technology immediately shifted to a higher pace. Dr. Emadi is recognized as one of the world's most prominent innovators in the field of electric powertrain technology.

As one of 19 top-flight international researchers hired through the new Canada Excellence Research Chairs Program, Dr. Emadi is spearheading the creation of a hybrid vehicle research facility in a new 4,600 square-metre automotive resource centre being planned for the McMaster Innovation Park. The centre brings together private-sector and public-sector organizations to develop new technologies, such as hybrid engines, batteries and lightweight materials. Dr. Emadi comes with a proven track record in creating marketable products from cutting-edge research and in creating spin-off start-up companies from the university environment — assets that will be of great benefit to Canada. NSERC will contribute up to **\$10 million** to his Chair program. He is receiving an NSERC Discovery Grant of **\$300,000**.

## Supporting Research, Supporting Industry

Formed in 1990, the McGill Metals Processing Centre (MMPC) is a vibrant Canadian research centre that conducts studies into the processing and production of advanced metallurgical materials.

Led by Roderick Guthrie, the MMPC provides its researchers with first-class facilities and state-of-the-art equipment to allow them to compete at the highest international levels. In keeping with its mandate for generic-type research in metals processing, many of its corporate partners are, or have been, major international companies in the ferrous and light metals industries. As such, the MMPC has become a truly international centre for process metallurgy. Among its supporting member companies, current and past, are Hatch, Novelis, Heraeus Electro-Nite, Sumitomo Metals Industries and Rio Tinto together with its subsidiaries QIT-Fer et Titane and Alcan. The group's many research achievements earned Dr. Guthrie a prestigious **\$200,000** NSERC Synergy Award for Innovation in 2010. Other NSERC investments in Dr. Guthrie's work total **\$1.23 million**, with industry partner contributions valued at an additional **\$461,000**.

NSERC Strategic Networks  
(2011-12)

**\$5.2 million**

NSERC investment in these networks  
this year (Manufacturing Priority Area)

### Networks

NSERC Network for Innovative Plastics  
Materials and Manufacturing Processes  
(NIPMMP)

NSERC Canadian Network for Research  
and Innovation in Machining Technology

NSERC Strategic Network for the  
Production of Single-type Glycoform  
Monoclonal Antibodies (Mabnet)

NSERC Magnesium Network  
(NSERC MagNET)

"It was perfect timing for us because the research findings have allowed us to significantly reduce our material costs and have placed us in a much stronger position technologically as we emerge from the latest recession."

John Persic  
Vice-President of R&D  
Microbonds Inc.

# Manufacturing



## Helping Manufacturers CHARM Their Way Into New Business

CHARM is a research project that together with General Motors of Canada, is exploring ways of deploying robots in manufacturing environments to enhance workers' capabilities and make production lines more flexible.

CHARM (Collaborative, Human-focused, Assistive Robotics for Manufacturing) is led by University of British Columbia (UBC) mechanical engineering professor Elizabeth Croft. A leading expert in the cutting-edge field of human-robot interaction, she is also NSERC's Chair for Women in Science and Engineering for the British Columbia and Yukon Region. Dr. Croft is working with researchers from UBC (Karon Maclean), McGill University (Frank Ferrie) and Université Laval (Clément Gosselin and Denis Laurendeau). The research focusses on the potential for smart machines to improve the ability of workers to handle an increased range of products and operations while improving product quality and worker safety. At a time of fierce global competition, this research could give Canada a significant edge in advanced manufacturing and further develop a highly skilled workforce as the marketplace undergoes rapid change. NSERC is investing **\$621,000** in the four-year Collaborative Research and Development project.

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## Cars for the 21<sup>st</sup> Century

AUTO 21, a Network of Centres of Excellence (NCE), aims to build a stronger, sustainable and globally competitive automotive sector in Canada.

Headquartered at the University of Windsor, AUTO 21 includes more than 400 researchers and industry, government and institutional partners from across Canada. Network projects explore issues ranging from consumer education in the use of safety devices to new or improved processes for design, materials and manufacturing, to advanced fuel research. The Network is receiving a total federal investment of **\$23.2 million**, including **\$17.4 million** from NSERC for its current five-year term.

## Some of NSERC's Partners in Manufacturing (2010-11)

3M Canada  
AEG Power Solutions  
Agropur coopérative  
Alcoa Canada  
Ballard Power Systems Inc.  
Bell Helicopter Textron Canada Ltd.  
Bombardier Inc.  
Bombardier Recreational Products (BRP)  
CAE Inc.  
Canadian Autoparts Toyota Inc.  
Canadian General-Tower Ltd.  
Dana Canada  
DELASTEK Aeronautics  
Dellux Technologies Inc.  
Dema Aeronautics Inc.  
DuPont Canada  
Excel Pac Inc.  
Ford Motor Company of Canada Ltd.  
General Motors of Canada Ltd.  
GlobVision Inc.  
Honda R&D Americas Inc.  
Honeywell ASCa Inc.  
IBM Canada Ltd.  
Lanxess Inc.  
Logistik Unicorp Inc.  
Magna International Inc.  
MDS Analytical Technologies  
Michelin North America (Canada) Inc.  
Micalyne Inc.  
Microbonds Inc.  
Norjohn Limited  
NOVA Chemicals Corporation  
Novelis Inc.  
Saputo Inc.  
Syngenta Crop Protection Canada Inc.  
Toyota Motor Manufacturing Canada  
Transtronic Inc.  
Westport Innovations Inc.  
Zenon Membrane Solutions

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