

NRC Manufacturing and Materials Engineering

Towards sustainable manufacturing in Canada

As the federal government's primary R&D and innovation resource, the National Research Council (NRC) contributes to the development of Canadian technology and its commercialization to stimulate the growth of world-class science and technology-based industries.

NRC's current business strategy, *Science at Work for Canada*, commits the organization to draw on the full breadth of its expertise to support the competitiveness of Canadian industry by focusing its R&D efforts in nine strategically important industry sectors for the Canadian economy.

NRC has identified the manufacturing and materials engineering (MME) industries as a key sector in which its expertise, multi-disciplinary competencies and infrastructure can make a significant science and technology contribution.



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Uniting key disciplines

Through NRC's key sector strategies, manufacturers using polymers, metals and composites will gain greater access than ever before to the organization's leading knowledge workers and unparalleled science and technology infrastructure.

These resources will help industry by developing technology solutions to address rising economic, environmental and regulatory challenges in order to remain sustainable and globally competitive.

NRC will draw on the full breadth of its expertise to support the Canadian manufacturing and materials sector.

Manufacturing: Canada's Largest Business Sector

Manufacturing is Canada's largest business sector, accounting for more than 16% of the country's economic activity and employing more than 2 million Canadians. Every dollar of manufacturing output generates 3 dollars of economic activity. But local and global dynamics – such as a fluctuating Canadian dollar, rising energy, labour and material costs, globalization, regulatory pressures as well

as growing demand for greener products – are affecting Canada's manufacturing performance.

NRC's efforts in the MME key sector will address the challenges of four manufacturing segments representing about 25% of the total Canadian industrial manufacturing output: Primary metals, plastics and composites, fabricated metal products and machinery.



Responding to industry

For over 30 years, NRC has dedicated significant research and technology development efforts in support of world-class primary materials producers, engineering firms, machinery manufacturers and thousands of component manufacturers linked to original equipment manufacturers (OEMs) through global supply chains.

The long-term needs of these manufacturing segments will be addressed by fostering:

- the commercialization of innovative value-added products and services
- the capacity of small and medium-sized Canadian companies to integrate domestic and global supply chains
- the development of resource-efficient manufacturing that will maximize the use of renewable resources, and minimise energy consumption, waste, and greenhouse gas production.

Innovation through Technology Platforms

Technology Platforms are strategic areas in which NRC can focus its multi-disciplinary technological, research expertise and industry support to foster the competitiveness of key industrial sectors.

Technology platforms related to manufacturing and materials engineering target strategic areas offering great opportunities for industrial activity.

Advanced Materials Design

Encompasses materials' multi-scale behaviour, functionality and performance development for lighter, safer, affordable and environmentally-conscious products through:

- Polymer blends, foams, composites and films
- Nanomaterials and particulate materials (metals and ceramics)
- Light and specialty metals (Al, Mg, Ti)

Innovative Processes

Includes materials processing from the laboratory scale to the industrial level aimed at producing lower cost, environmentally-friendly components, devices, assemblies and systems:

- Automation, machining, and robotics
- Joining and surface technologies
- Moulding and forming
- Nano-micro manufacturing of polymers and metals

Decision-Aid Systems

Brings together advanced computational and sensing capabilities to improve quality, efficiency, safety and environmental friendliness through simulation models, machine-operator interaction hardware, processes monitoring diagnostics and performance evaluation.

NRC expertise in this platform includes:

- Modelling, simulation and machine-operator interaction hardware
- Monitoring of materials manufacturing, structural integrity and systems performance
- Standards and evaluation of performance

An Invaluable Support to Innovation

NRC's unique MME technology and innovation platforms can play a strong role in Canada to enhance the productivity and competitiveness of the Canadian industry.

NRC MME key sector will carry out its R&D in collaboration with the Canadian manufacturing industry and help it integrate world-leading technologies through programs such as the Cross-Council Advanced Materials Initiative (see sidebar).



It will help firms access NRC's research expertise, state-of-the-art facilities and IRAP/CISTI Manufacturing Network team, bringing together approximately 450 NRC researchers, information analysts and industrial technology advisors.

It will provide support services to foster the creation and growth of emerging technology-based companies through:

- Incubation in Industrial Partnership Facilities (IPF)
- Access to NRC prototyping facilities
- Business support, linkages with venture capital as well as technical and competitive intelligence services



CROSS COUNCIL ADVANCED MATERIALS INITIATIVE

As part of the MME key sector program, NRC has created the Cross Council Advanced Materials Initiative (AMI) which will focus on **polymer composites** and **surface technologies**. The goal of the initiative is to address the needs of the **Aerospace, Automotive, Construction** and **Manufacturing** industries for superior structural materials as well as light weight and green materials with improved functional performances. This multi-million dollar initiative focuses on partnerships with key stakeholders in the R&D community and in each of the targeted industries.

CONTACT US

Blaise Labrecque
Strategic Advisor, NRC-IMI

E-mail: Blaise.Labrecque@imi.cnrc-nrc.gc.ca

Telephone: 450-641-5299

75 de Mortagne Blvd
Boucherville, Quebec
J4B 6Y4 Canada

www.nrc-cnrc.gc.ca