

AEROSPACE MANUFACTURING TECHNOLOGY

Aerospace Manufacturing Technology Centre

The Aerospace Manufacturing Technology Centre (AMTC) of the NRC Institute for Aerospace Research (NRC Aerospace) is a new initiative built in partnership with Canada Economic Development for Québec regions.

Located on the campus of the Université de Montréal, its aim is to develop core competencies and demonstrate modern aerospace manufacturing technologies that have the potential for significant cost savings, while also maintaining high levels of quality, reliability and performance. Its R&D activities mobilize existing facilities and programs at NRC Aerospace and at other related NRC institutes and programs across Canada to help industry implement advanced, cost-effective manufacturing methods for aerospace. A major focus is to facilitate the transition to next-generation manufacturing, particularly among small and medium-sized enterprises (SMEs).

The AMTC accommodates approximately 100 people (including staff and guest workers from industry and universities) who investigate technologies in four major research areas:

- forming and joining of metallic products
- fabrication and joining of composite structures
- automation, robotics and intelligent manufacturing systems, and
- advanced material removal.

Metal forming and joining

Metal forming expertise is available to develop forging and hydroforming processes for aerospace component production. Technologies for joining metal alloys, such as laser, electron beam, linear friction and friction stir welding, are also investigated, as is the application of cladding technologies for engine component repairs.



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Composite structures fabrication and joining

Studies are underway to improve liquid composite moulding technologies through use of flexible tooling and to advance thermoset composites production through the application of automation and on-line cure monitoring. Other investigations include use of automated fibre placement in aircraft component manufacturing, and development of new joining technologies for composite materials, such as resistance welding of thermoplastic composites.

Automation, robotics, and intelligent manufacturing systems

NRC Aerospace has expertise and facilities for projects in automation, robotics, and intelligent manufacturing systems. A large gantry system equipped with two multi-axial industrial robots enables development of automated systems for assembling aircraft structures. Intelligent surface treatment and automated surface finishing technologies are also investigated. Modeling and simulation capabilities support these activities.

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Main bay area housing equipment

Advanced material removal

NRC Aerospace also develops high-performance, high-speed machining technologies to facilitate production of high-complexity parts, thin-walled structures, and aerospace materials. These include laser and vibration assisted machining, super-abrasive grinding, dry machining, and machining under minimum quantity lubrication. Other work is carried out to enhance machine tool accuracy and cutting tool performance as well as optimize machine processes.

Facilities

Major facilities include:

- a 500-ton isothermal forging press
- a 1000-ton hydroforming press
- Nd-YAG and CO₂ laser, electron beam, friction stir and linear friction welding machines

- fibre placement machinery
- a 20' x 6' high-temperature autoclave with a clean room
- resin transfer moulding equipment
- a 20' x 20' x 20' gantry with two multi-axial Kuka robots for automated assembly/riveting
- intelligent shot peening equipment
- a 5-axis Makino multi-tasking machining center
- a 6-axis Boehringer two-spindle turning centre, and
- an online coordinate measuring machine.

CONTACT:

Mr. Pierre Dicaire

Director, AMTC

NRC Institute for Aerospace Research

P.O. Box 40, Station Côte-des-Neiges

Montreal, Quebec, Canada H3S 2S4

Tel: (514) 283-9139 Fax: (514) 283-9484

E-mail: pierre.dicaire@nrc-cnrc.gc.ca

Ms. Michèle Parent

Business Development and Contracts, AMTC

NRC Institute for Aerospace Research

P.O. Box 40, Station Côte-des-Neiges

Montreal, Quebec, Canada H3S 2S4

Tel: (514) 283-9622 Fax: (514) 283-9484

E-mail: michele.parent@nrc-cnrc.gc.ca

Or visit our Web site at: www.nrcaerospace.com

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