QUÉBEC'S AEROSPACE SECTOR
JOURNAL



VOLUME 3 – AUTUMN 2010

AEROSPACE INNOVATION

All aboard!

To remain competitive, Québec's aerospace industry has decided, among other measures, to focus its efforts on aerospace innovation and greener technologies since R&D investments remain a crucial factor for competitiveness.

In this 3rd issue of Québec's Aerospace Sector Journal, our theme is innovation and the importance of investing heavily in research and development (R&D). This will allow companies to move up the global supply chain, better position our industry and increase Québec content on future platforms.

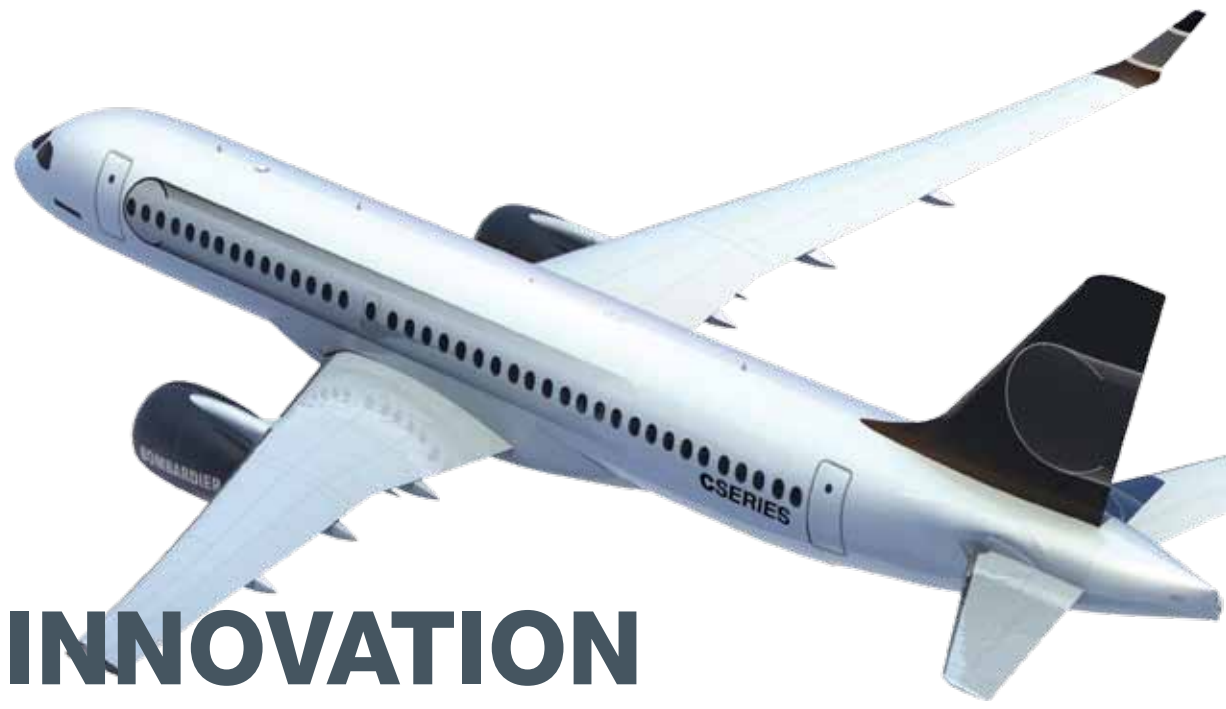
Our industry faces the rise of emerging economies such as China and India, who are investing significantly in innovation and in their manufacturing sectors. In addition, the global competitive landscape is now dominated by environmental protection and requires the development of aircrafts that consume less fuel and are less polluting.

The Québec aerospace sector, a world-recognized model of excellence, has earned the confidence of major aerospace manufacturers. Its capacity for innovation is recognized worldwide. So too is its creative and highly specialized workforce. Despite all these advantages, the industry needs to intensify its efforts in innovation to maintain its leadership position.

To do so, the aerospace industry has chosen to leverage collaboration and partnerships. Through the work of Aéro Montréal's Innovation Working Group, cluster members have reiterated the importance of continued investment in fundamental and pre-competitive research at the university level and in research centres. They have also identified the need to increase the innovation capacity of the global supply chain. And they have successfully launched an initiative aimed at transferring technology to the product demonstration stage that will create wealth for Québec.

The impressive results of the Innovation Working Group reaffirm the importance of Aéro Montréal's mission as a strategic think tank for the cluster. Unquestionably, it is by pooling our knowledge and expertise that we will be able to launch structural projects that will ensure the competitiveness of our industry.

Gilles Labbé
Chairman of the Board of Aéro Montréal
President and Chief Executive Officer of Héroux-Devtek Inc.



INNOVATION LEADS THE WAY
HOW TO FACE COMPETITION

In aerospace, technical excellence and innovation have always been cited as being critical to competitiveness. Today, this is truer than ever. We live in an environment where the level of competition is intensifying. Many emerging markets now compete directly with us on world markets.

With this in mind, Aéro Montréal, Québec's Aerospace Cluster, created the Innovation Working Group. Like Aéro Montréal's four other working groups – Branding and Promotion; Human Resources; Supply Chain and National Security and Defence – the Innovation Working Group identifies strategies to grow our expertise and give our industry an edge against the competition.

The working group has launched a program that aims to accelerate industrial research with a view to developing what is called the "greener aircraft." With a budget of $150 million over four years, financed 53% by industry and 47% by the Government of Québec, the Greener Aircraft Catalyst Project features five demonstration projects related to aircraft fuselage structures, fuel efficient engine, integrated avionics for cockpit applications, integrated avionics for critical systems, and landing gear of the future.

By accelerating research and development of new aerospace technologies that respond to the future needs of major OEM's and equipment manufacturers, the Québec industry is enhancing the sector's capacity to create wealth in a highly competitive global economy.

235 companies with more than **40,000** employees, revenues of **$12.4 billion**... Greater Montréal is, along with Toulouse and Seattle, one of the three world aerospace capitals. This remarkable industrial concentration ranks No. 1 in Québec R&D in the manufacturing sector and accounts for **70%** of all R&D expenditures made in Canada.

Aéro Montréal, Québec's Aerospace Cluster, is a strategic think tank that brings together all the major decision makers in Québec's aerospace sector, including companies, educational and research institutions, associations and unions.

Aéro Montréal's mission is to mobilize industry players around common goals and focused actions to increase cohesion and optimize competitiveness. By fostering the growth and expansion of the aerospace cluster, it intends to make this industry an increasingly important source of wealth creation for the Montréal region, Québec and Canada.

Published by:
AÉRO MONTRÉAL
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COMPLETING THE INNOVATION CHAIN

A MOBILIZING PROJECT FOR OUR INDUSTRY

Aerospace is a high-tech sector whose growth potential is closely linked to innovation. To ensure the participation of Québec companies on future major platforms, Québec must have an integrated approach and increase the innovation capacity of all links in its supply chain. In this regard, Aéro Montréal is the ideal forum for working together and ensuring the implementation of concerted actions.

The global economy is changing and competition is knocking at our door! This situation is creating great opportunities and is motivating our industry to move forward and excel.

To do so, it is imperative that we develop, starting right now, new technology concepts that will ensure the development and commercialization of competitive products that will impact our environment and our economy for decades to come.

Since the development and validation of new technology concepts require large investments over long periods, several nations, such as the European Union and the United States, have established framework programs for technology demonstrators to support their respective industries. And thanks to the work of Aéro Montréal's Innovation Working Group, Québec is also taking action!

The Greener Aircraft Catalyst Project will help to complete Québec's aerospace innovation chain and lead to technology demonstration projects that are strategic for the industry.

Following the stages of fundamental and pre-competitive research, the technology demonstration stage represents a vital step for transferring this technology to the commercialization of products that will generate wealth and allow Québec to stand out from the competition.

In addition, by fostering ties among SMEs, OEMs and large manufacturers, this project will make the Québec industry more competitive and promote the integration of Québec content on new aircraft platforms.

This rallying project is one of many examples of actions initiated by Aéro Montréal's Innovation Working Group that will benefit the entire industry. And we intend to continue our efforts to enable our industry to reach new heights.

François Caza
Chair of the Innovation Working Group of Aéro Montréal
Vice President and Chief Engineer, Bombardier Aerospace

GOING GREEN

With the Greener Aircraft Catalyst Project, the Québec aerospace industry is aiming to lay the foundation for the plane of the future: more ecological, equipped with intelligent systems and less expensive to manufacture with enhanced performance and better fuel efficiency.

"What we are looking to develop," says Fassi Kafyeke, Director, Strategic Technology at Bombardier Aerospace, "are airplanes that, by incorporating several new technologies, will be lighter, better performing, quieter and produce less carbon."

The first goal in developing greener aircraft is to conserve our environment and thereby meet a vital need in our society. For the industry, there is no doubt that more sustainable airplanes will also be a key to competitiveness in the field of aviation. "Everyone knows that in 10 or 15 years, aircraft with a reduced environmental footprint will have a clear competitive advantage over others," says Mr. Kafyeke. "This is especially true in a context where there are more and more players. If we are to maintain our advantage in Québec, we must start developing, beginning right now, the technologies needed to design and manufacture such aircraft."

The demonstration program for more ecological technologies, the result of Aéro Montréal's Innovation Working Group, is part of a strategy designed to allow the entire aerospace industry to participate in the quest for sustainable development and stand out from the competition. Within three or four years, this initiative will allow partners to participate in specific projects and to bid on major programs.

And according to Mr. Kafyeke, developing a greener aircraft could take less time than some believe. "It's on the horizon for 2017 to 2020," he predicts.

GREENER AIRCRAFT CATALYST PROJECT

Companies' area of specialization	Entreprises
Aircraft fuselage structures in composite materials	Bombardier Aerospace and Bell Helicopter Textron Canada
Fuel efficient engine	Pratt & Whitney Canada
Integrated avionics for cockpit applications	Esterline CMC Electronics
Integrated avionics systems for critical systems	Thales Canada
Landing gear of the future	Héroux-Devtek

"IN THE LONG TERM, THIS PROJECT WILL ALLOW FOR A SIGNIFICANT REDUCTION IN THE ENERGY FOOTPRINT OF OUR INDUSTRY."

INTEGRATED AVIONICS FOR COCKPIT APPLICATIONS

Improving navigation performance to save fuel

Increased air traffic is causing congestion at airports, forcing aircraft to circle until a runway is available and resulting in unnecessary fuel burn.

"Currently, navigation management is not sufficiently accurate in many aircraft, apart from the largest and newest ones, to predict the exact landing time," says Patrick Champagne, Vice President, Cockpits & Systems Integration at Esterline CMC Electronics.

The weather is another variable which has an impact on takeoffs and landings and, consequently, aircraft fuel consumption.

"To limit these effects, we are working on cockpit technologies that will improve navigation performance and help to better predict landing time, reduce distances between aircraft, and operate more efficiently in inclement weather conditions."

How will this be achieved? Mainly through a better integration of onboard functions in the cockpit. "This involves bringing together, in front of the pilot, calculating, display, control and signal reading capabilities in an area that is physically smaller, much like we display various programs on a single computer screen."

The result: the integration of information will enhance the performance of the aircraft's various systems and give pilots faster and better structured access to information they need. This in turn will help them make better decisions.

"In the long term," says Mr. Champagne, "this project will allow for a significant reduction in the energy footprint of our industry."

AIRCRAFT FUSELAGE STRUCTURES

Lighter materials and less expensive processes

Aircraft fuselage structures are currently made of metal alloys that have an impact on aircraft weight and fuel consumption. The project, conducted jointly by Bombardier Aerospace (BA) and Bell Helicopter Textron Canada (BHTC), aims to develop lighter fuselages that will result in better energy efficiency and reduced carbon emissions.

"Our research is focusing on composite materials made of carbon fibre," says Fassi Kafyeke, head of strategic technologies at BA. "We are exploring all kinds of technologies to achieve the most efficient and cost-effective solutions."

In recent years, the two companies have worked – in collaboration with the NRC – on an automatic fibre placement technology to make the manufacturing process more efficient.

"Not only do we want to reduce the environmental footprint of future aircraft, but we also want to have lower-cost manufacturing processes," says Pierre Rioux, Director, Canadian Research at BHTC. "We want to minimize waste as much as possible by optimizing the use of materials. We also want to reduce the manufacturing cycle by assembling the pieces in an automated fashion that is faster and consistent."

But there are many experiments to be done, he admits. "We need to know the properties of each material and be able to demonstrate to airworthiness authorities that we can produce them consistently and safely."

Starting in 2011, BA and BHTC will have a team working full time on this project. "In four years we will have mastered new advanced technologies to assemble a fuselage made of composite materials in an automated way," says Mr. Kafyeke.

"INSTEAD OF BEING JUST SUPPLIERS, WE ARE BECOMING DEVELOPERS."

Joe Marcheschi, *Avior*

There are many players behind the greener aircraft project. Companies such as BA and BHTC have partnered with SMEs to meet the challenge.

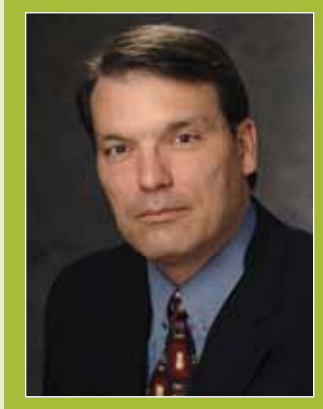
Avior is among the SMEs involved in the project.

"We are working to develop new materials, working methods, manufacturing processes and tools that will help minimize the impact of aviation on the environment and meet the technical requirements related to aircraft of the future," explains Joe Marcheschi, Director of Sales, Marketing and New Programs at Avior.

For Avior and other participating SMEs, this is a great opportunity to improve knowhow. "Instead of being just suppliers," argues Mr. Marcheschi, "we are becoming developers. This knowledge will enhance our potential in addition to strengthening the Québec aerospace industry."

The proximity between prime contractors and SMEs in Québec is invaluable, adds Mr. Marcheschi. "They want to develop a supplier base that they can trust and rely on to implement immediate solutions."

In addition, the expertise they will have gained could open doors to other platforms, especially for export. "By working on the greener aircraft project, we believe that within the next two or three years we can provide improvements to existing products here or elsewhere in the world."



FUEL EFFICIENT ENGINE

For obvious reasons, developing an engine that consumes less energy is central to efforts to develop greener aircraft.

A team at Pratt & Whitney Canada is currently developing a new, ultra-efficient high pressure compressor to enhance engine performance.
"The higher the pressure inside the compressor, the higher the thermodynamic cycle, which means less fuel is needed," says Mario Modafferi, Senior Director, Research and Technology, P&WC. "This means developing advanced components for this type of compressor and increasing the overall pressure ratio. This also allows for a reduction in component size and weight, another important element in the development of greener aircraft."

The project will also require the development of new materials because those currently being used could not withstand the heat generated by increased pressure. "We will turn instead to nickel alloys. We are also looking to develop new processes to reduce manufacturing and maintenance costs for new engines. Finally, the project aims to develop more efficient electrical components that will facilitate integration of the engine into future generations of aircraft."

INTEGRATED AVIONICS FOR CRITICAL SYSTEMS

Airplanes that are smarter, more electric, lighter, more durable and more adaptable

Today, the aerospace industry is looking to integrate aircraft critical systems – flight controls, wings, engines, landing gear, etc. – into one highly integrated and intelligent system. That is what the Thales Group, in collaboration with Bombardier Aerospace, is working on as part of the integrated avionics for critical systems project.

"We want to put all these separate systems on a network, on the same computer platform," explains Philippe Molaret, Vice President of Operations at Thales Canada. "Instead of having different electronic units, we want to implement, in the aircraft, a standard electronic platform capable of accepting these critical functions and networking them."

Right away, this should save weight by reducing the amount of copper used in the aircraft. But by linking these functions in a network, it will also be possible to adjust and optimize their performance. This could translate into lighter structures, reduced drag, lower operating energy requirements and, therefore, fuel savings.

"Furthermore, passenger comfort could be enhanced in an intelligent aircraft," maintains Mr. Molaret. "For example, we will be able to cushion the effects of turbulence using the flight controls and make changes of direction smoothly through a better coordination of yaw and roll."

The intelligent aircraft will also be highly adaptable because it will be easier to reconfigure it to change its original mission and functions. "This is lifecycle management of the product," says Mr. Molaret. "We can improve the ability of the aircraft to be more productive throughout its life."

"WE ARE LOOKING TO DEVELOP A LIGHTER AND MORE DURABLE LANDING GEAR WHICH ALSO OFFERS A GREATER RESISTANCE TO CORROSION."

LANDING GEAR

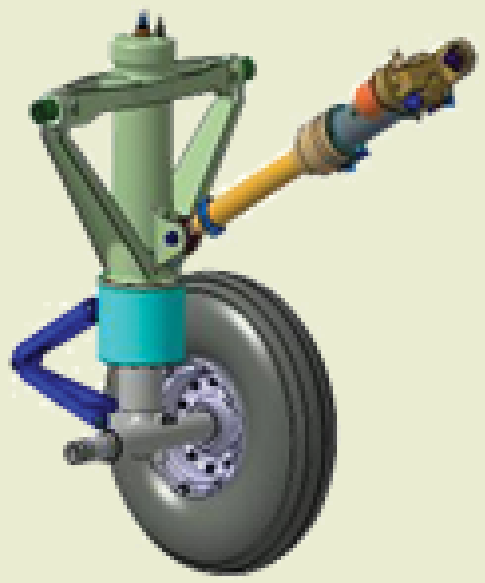
Lighter, more durable and quieter

Landing gear are still largely made from steel-based materials combined with surface treatments that improve their resistance to corrosion. As part of a demonstration project for landing gear of the future, Héroux-Devtek – the world's third-largest manufacturer of landing gear – is looking to develop a system that will be lighter while providing the required resistance.

"This can be done by using better performing composites or other types of alloys," explains Patrice Gauvin, Vice President of Business Development at Héroux-Devtek.

"We are looking to develop a lighter and more durable landing gear which also offers a greater resistance to corrosion. We also want it to be quieter and 'intelligent', that is to say equipped with sensors that provide real-time data acquisition, optimize performance and prolong useful life."

Héroux-Devtek is currently at the stage of forming a team and talking with other partners in the supply chain to set the research parameters for this project. "Within two to four years, we are confident of making significant progress in one or another aspect of our research."



GLOBAL SUPPLY CHAIN SUMMIT

The first ever Global Supply Chain Summit, held under the theme "A Global Supply Chain for a Global Economy: Challenges and Opportunities in the Aerospace industry," brought together more than 300 participants and supply chain experts last spring.

"To respond to current economic conditions and the rapidly changing needs of customers, aerospace companies must now start adopting more competitive and innovative models by developing management capacities and partnerships in a strong, integrated and flexible global supply chain," said Janice Davis, Vice President and Chief Procurement Officer, Bombardier Aerospace, and Honorary Chair of the Summit.

For her part, Suzanne M. Benoît, CEO of Aéro Montréal, noted that the Québec industry has undeniable strengths that are recognized around the world. "However, to strengthen its competitiveness and maintain its leadership position, it is imperative we reposition our supply chain to meet the needs of global prime contractors on both civil and military programs."

"The procurement landscape in the aerospace industry is undergoing a rapid transformation," said Philippe Hoste, Chair of Aéro Montréal's Supply Chain Working Group and Chief Executive Officer of Sonaca Montréal. "To respond to international competition and simplify the supply chain, OEMs are reducing their number of sub-contractors, preferring to work with companies that will act as integrators for several suppliers."

This trend is driving the development of partnerships between OEMs and suppliers, from co-design to risk management and the supply chain. "To position themselves for future aircraft programs, Québec companies must innovate not only technologically but also in the area of management," said Mr. Hoste. "SMEs need to follow this trend and even possibly join forces to have more leverage with major prime contractors."

AÉRO MONTRÉAL'S MACH INITIATIVE:
OPTIMIZING QUÉBEC'S AEROSPACE SUPPLY CHAIN

AÉRO MONTRÉAL | MACH Chaîne d'approvisionnement Supply Chain

During the Farnborough International Airshow, Aéro Montréal launched the MACH Initiative designed to optimize the performance of Québec's aerospace supply chain and increase its global competitiveness.

Stemming from the work by Aéro Montréal's Supply Chain Working Group, the MACH Initiative is the result of joint discussions among members of the cluster and intends to be a unifying process to support the long-term strategic growth of the sector.

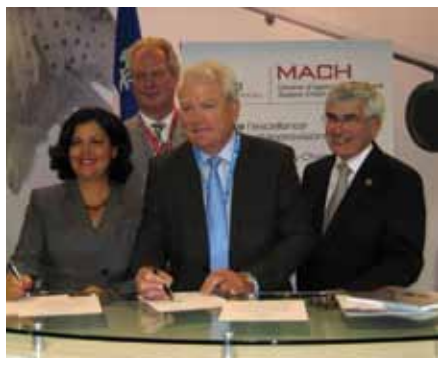
Transforming the supply chain requires the development and continuous improvement of all stakeholders. The MACH Initiative aims to strengthen the supply chain structure and companies involved in it by creating special collaboration links among customers and suppliers. It will also promote the implementation of strategies and projects which will help fill in existing integration gaps of the Québec aerospace supply chain. By doing so, it aspires to help develop a world-class supply chain.

Centered on a program of developing supplier competitiveness, including a performance label, all the measures deployed as part of the MACH Initiative will allow suppliers to evaluate their situation, identify opportunities for improvement, and take appropriate action. Mechanisms to develop and welcome world-class system integrators will be implemented, in collaboration with our various partners, to strengthen the weak links in Québec's aerospace supply chain in areas such as aero structures, avionics, cabin interiors and hydraulic systems.

Mentored by Bombardier Aerospace, MACH will begin with a pilot project that will involve about 20 Québec suppliers who will benefit from services offered by the initiative as well as the expertise and guidance of more than six world-class manufacturers.

The initiative will progressively make available to participating companies services, tools and methodologies to evaluate and improve their performance and market position and further develop business opportunities.

A strategic collaboration agreement between
AÉRO MONTRÉAL AND NORTH WEST AEROSPACE ALLIANCE



Aéro Montréal signed a framework agreement on cooperation with North West Aerospace Alliance, the United Kingdom's Aerospace Cluster, during the Farnborough International Airshow. This agreement aims to establish a special relationship between the two parties, increase the collaboration in supply chain optimization, and exchange benchmarking data.

In general, this agreement involves the exchange of information on programs to optimize the supply chain and on product offers and needs and expectations of members of the two clusters.

"The signing of this agreement is a real opportunity for the sector to benefit from the expertise of a foreign partner in supply chain management and to build bridges and forge alliances with companies in the United Kingdom," says Suzanne M. Benoît, CEO of Aéro Montréal.

Aéro Montréal has signed several similar agreements with Aerospace Valley, World Competitiveness Cluster Midi-Pyrénées & Aquitaine, Spatial SKYWIN, Aerospace Cluster of Wallonia, BavAIRia, the Aerospace Cluster of Bavaria, "Hamburg — The place for aviation" Aerospace Cluster of Greater Hamburg, and with Poland's Aviation Valley Association.

Symposium franco-québécois 2010

As the leader of the delegation representing Québec's aerospace centre of excellence, Aéro Montréal participated in the second **France-Québec Symposium** that was held in France November 24-26, 2010.

The 2010 France-Québec Symposium, organized jointly by MDEIE and its French counterpart, aimed to promote ties between the Québec and French competitiveness clusters. The goal was to accelerate the emergence and implementation of new technology and industrial and business partnerships among the various participants.

Some 20 participants from Québec's aerospace sector, representing OEMs, SMEs, research centres and universities, met the French delegation led by Aerospace Valley, World Competitiveness Cluster Midi-Pyrénées & Aquitaine.

During the event, conferences and workshops were held on the themes of sustainable development, human capital, UAVs and satellite systems. Five agreements were signed and four other exploratory joint projects presented.

FORUM AEROSPACE INNOVATION

DON'T MISS THE 2011 AEROSPACE INNOVATION FORUM IN MONTRÉAL!

Aéro Montréal's Innovation Working Group, in collaboration with CRIAQ and GARDN, will host the 3rd Aerospace Innovation Forum in Montréal on **December 5 and 6, 2011**.

Conferences by recognized international experts and researchers in aerospace innovation will be featured in the Forum program, in addition to B2B meetings and exhibitions of innovative technologies.

Mark this event down now in your calendar!

Organized by: AÉRO MONTRÉAL

In collaboration with: CRIAQ www.criaq.aero GARDN

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Produced in collaboration with Les Éditions du Vendredi and Mr. Serge Rivest

Printed on recycled paper

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Printed in Canada

Design: CGCOM.COM