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GLOBAL BUSINESS REPORTS

# Quebec Aerospace

## 2015



AÉROMART MONTRÉAL  
PRE-RELEASE  
EDITION

# QUÉBEC AEROSPACE A WORLD OF OPPORTUNITIES

More than **200** companies


Close to **42,000** workers

Sales of **13.8** billion, of which **80%** come from exports

**55%** of Canadian aerospace sales

**70%** of total spending in R&D performed in Canada

QUÉBEC AEROSPACE INDUSTRY is well known for its cutting-edge expertise in the design, manufacturing, integration, servicing and repair of aircraft, engines, simulators and sub-systems such as avionic suites and landing gears.

Québec 

AÉRO   
MONTREAL  
Québec's Aerospace Cluster

# Dear Readers,

On the strength of the vitality and spirit of initiative of its businesses, the Quebec aerospace industry is recognized for its considerable capacity to reinvent itself. What is more, the expertise of more than 200 efficient, innovative firms, including 15 principal contractors and equipment manufacturers, now ranks Quebec as a leader among the world's biggest aerospace centers.

Aerospace is a veritable driving force in the Quebec economy and accounts for nearly 42,000 specialized jobs. We are relying on this skilled labor and on the constantly changing sector's other undeniable advantages in order to bolster our competitiveness and further promote investments in Quebec.

More than ever, our industry possesses the strengths necessary to carry out innovative projects that serve as catalysts for the sector. Quebec firms offer complementary, diversified products in addition to investing in research and development that enables them to consolidate their reputation for excellence from the standpoint of innovation.

Quebec also offers investors an attractive business environment, one that is particularly renowned for its specialized training establishments and state-of-the-art research centers.

Numerous possibilities await companies that undertake promising projects in this flourishing sector. We therefore invite investors from the world over to opt for Quebec talent and to discover the rewarding business opportunities that Quebec and its aerospace industry have to offer.

We are indeed proud to present in the pages that follow entrepreneurs who are keenly interested in this industry, which is a veritable economic linchpin and a source of wealth for Quebec.

**Jacques Daoust**  
Minister of the Economy, Innovation and Exports

**Suzanne M. Benoît**  
President and CEO, Aéro Montréal

**Québec** 

**AÉRO**   
**MONTREAL**  
Québec's Aerospace Cluster

## Welcome,

The pre-release of our Quebec Aerospace report published in partnership with the Ministry of Economic Development, Innovation and Export Trade and Aéro Montréal is the culmination of twelve weeks of research and interviews with the sector's top executives across the supply chain who generously donated their time and insights. We look forward to receiving feedback and interviewing more industry players for the final version of our report to be released in June 2015 at the Paris Bourget Show.

**Gabrielle Morin**  
Project Director

**Bryce Stevenson**  
Journalist

**Global Business Reports**



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## Quebec Aerospace 2015

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# Quebec's Aerospace Cluster

## *A Diversified Ecosystem*

The field of aerospace is a pinnacle of high technology achievement. While many regions of the world wish to develop a toehold in the aerospace sector, few have been able to accomplish this feat as successfully as the Canadian province of Quebec.

Canada's aerospace industry has a history of over 100 years, and Quebec has emerged as its epicenter; the province drives 55% of the country's total aerospace activity. A defining feature of Quebec's aerospace industry is its concentration: 98% of its activity stems from the region of Greater Montreal, which renders it the third largest hub for aerospace activity in the world behind only Seattle in the United States and Toulouse in France. The Quebec aerospace cluster is comprised of 41,750 highly skilled employees, four prime-contractors (OEMs), roughly 15 tier-one suppliers (integrators), and over 190 small to medium-sized enterprises (SMEs). Due to its extensive composition, Quebec is recognized to contain, within a 30-kilometer radius, enough companies with ample capabilities to build an entire aircraft.

Dedication to research and development (R&D) further reinforces Quebec's impressive position amongst the global aerospace community. Greater Montreal

accounts for 70% of Canada's total investment in aerospace R&D initiatives, a figure which amounts to C\$700 million annually. Continual R&D investment has been key to sustaining the industry's growth, which has averaged 5.9% annual growth over the last 25 years. In 2014, growth jumped to 14.9%, elevating annual revenues to C\$13.8 billion. As one of Quebec's most successful industries, aerospace is also its most highly exported sector, with 80% of its activity targeted at international markets.

The driving force behind Quebec's aerospace activity is the presence of four OEMs: Bombardier, Bell Helicopter, Pratt & Whitney Canada (P&WC), and CAE. Quebec is the only Canadian province to benefit from such a strong concentration of OEMs. Supporting the OEMs is a host of roughly 15 local and multinational integrators, including Héroux-Devtek, L-3 Communications MAS, Mecachrome Canada, Rolls-Royce Canada, Sonaca Montreal, and Thales Canada. While integrators supply OEMs with comprehensive end-to-end solutions, they rely upon an extensive network of SMEs to deliver their end products. A distinguishing quality of Quebec's aerospace cluster is the extent of its base of uniquely specialized SMEs. In addition to its exhaustive base of industrial compa-

nies, Quebec has roughly 20 public and private research centers entrenched in the field of aerospace, which play a critical role in supporting the industry's activity and development. Quebec is also home to international aviation organizations such as the International Air Transport Association (IATA), the International Business Aviation Council (IBAC), and the International Civil Aviation Organization (ICAO). Due to the variety of its stakeholders and its tightly-knit composition, Quebec's aerospace cluster has garnered worldwide acclaim for its culture of collaboration and capacity to innovate. These dynamic qualities have affirmed its position as a world-leading aerospace hub.

The link that binds Quebec's aerospace industry together is Aéro Montréal, an inclusive association of industry members, which serves as a think-tank and sounding board for enhancing industry collaboration and competitiveness. Aéro Montréal champions working groups and cluster-wide initiatives to realize its mission of driving growth within the industry. Its working groups focus on themes such as supply chain development, branding and promotion, and innovation, while its initiatives tackle topics such as developing the next-generation of environmentally



*The Bell 505 Jet Ranger X incorporates speed, range and comfort that will deliver you in style. Photo courtesy of Bell Helicopter.*

friendly aircraft (Greener Aircraft Catalyst Project, also known as SA<sup>2</sup>GE) and optimizing the competitiveness of Quebec's aerospace supply chain (MACH Initiative). The overarching goal of these programs is to promote industry collaboration, while strengthening its capabilities on a global scale.

The government of Quebec recognizes the significance of R&D in driving the aerospace sector's competitiveness and has consequently installed a framework that is conducive to aerospace innovation. Initiatives such as the Greener Aircraft Catalyst Project fostering the development of technologies for the next generation of aircrafts demonstrate the cluster's capacity to innovate. While Quebec's aerospace cluster benefits from a supportive business environment and favorable fiscal policies, the provincial government also encourages industrial partnerships with consortiums and research and development centers in Quebec.

The Consortium for Research and Innovation in Aerospace in Quebec (CRIAQ), is

one such organization formed to support R&D initiatives within Quebec's aerospace industry. CRIAQ is an industry led organization charged with bridging the academic and industrial sectors. Through applying university research to practical industry situations, CRIAQ has overseen 110 aerospace oriented R&D projects with a cumulative worth of C\$107.6 million, which have resulted in substantial cost savings for industry members.

The aerospace cluster is also supported by the Centre de Recherche Industrielle du Québec (CRIQ), which assists aerospace companies with certification, testing, and R&D. According to Denis Hardy, president and CEO of CRIQ, it is currently undertaking a program that will result in "reduction of aircraft engine-emissions for cleaner air." The program also has a mandate from the government to develop a 3-D printing network in Quebec, which "will come to the forefront of supporting manufacturing profitability in the future."

A combination of expertise, collabora-

tion and innovation has made Quebec's aerospace cluster renowned in the global aerospace industry; however, with the emergence of strong international competition within the aerospace sector, the cluster will need to take steps to further develop and differentiate its capabilities. Speculating on the future prospects of Quebec's aerospace industry, the Honorable Jacques Daoust, Minister of Quebec's Ministry of Economic Development, Innovation and Export Trade (MEIE), said: "The aerospace industry's future hinges on four key factors. First, we must promote the development of principal contractors in the sector. Second, we must round out the Quebec supply chain by attracting new first-tier equipment manufacturers and integrators. Third, we must foster broader competitiveness and productivity in Quebec SMEs. To this end, we must promote their consolidation and the automation of manufacturing processes. Lastly, the Quebec aerospace sector must remain at the forefront of technology by making innovation a genuine priority." •

The banner features a stylized satellite or orbital logo at the top center. Below it, the text reads 'FORUM AEROSPACE INNOVATION'. A large red banner across the middle contains the text 'Don't miss the 5th edition of this major international event'. Below this, it states 'TAKING PLACE IN MONTRÉAL, QUÉBEC, CANADA' and 'Palais des congrès - April, 2016 - aeromontreal.ca'. On the right side, a vertical list of statistics is presented against a background of clouds: '1,000 participants', '20 OEMs', '100 world class speakers', and '1,000 B2B technology meetings'. The year '2016' is displayed in large, light grey numbers at the top right. The word 'MONTRÉAL' is written vertically in large, light grey letters on the left side. At the bottom, the organizing body 'AÉRO MONTREAL Québec's Aerospace Cluster' is shown on the left, and 'In collaboration with CRIAQ' is shown on the right with its logo.

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Organized by **AÉRO MONTREAL**  
Québec's Aerospace Cluster

In collaboration with **CRIAQ**

# Hon. Jacques Daoust

Minister, Ministry of Economic Development, Innovation and Export Trade (MEIE), Government of Québec



*"Bearing in mind federal tax credits, Quebec's fiscal policy is among the most generous in the world."*

## **Quebec's Aerospace Cluster is composed of over 205 companies, 41,750 workers, and \$13.8 billion in annual sales. What is the strategic importance to Quebec's economy?**

The aerospace industry is of very strategic importance to the Quebec economy overall for several reasons. First, mention should be made of the significant number of jobs in the sector and the quality of such jobs, which require high qualification, are highly technological and foster innovation. In Quebec, it is estimated that one worker in 97 possesses an aerospace diploma, 1.5 times higher than the proportion in France and 2.5 times higher than in the United States. Moreover, the aerospace industry affords Québec a veritable window on the world. In 2013, it ranked first among manufacturing industries and accounted for 11.6% of total exports. Furthermore, 80% of output in the aerospace sector is exported outside Canada. To fully grasp its importance, it should be noted that Quebec's aerospace sector accounts for 1.35% of its GDP. The Canadian aerospace sector accounts for only 0.42% of Canada's GDP.

## **What is MEIE's role supporting Quebec's aerospace industry?**

The MEIE plays a twofold role with respect to the aerospace sector in that it maintains a favorable business environment and supports the industry's growth.

What do we mean by a favorable environment? Among other things, this means competitive taxation, an extensive pool of highly qualified manpower (semi-skilled workers, technicians, engineers and scientists) and the presence of universities and research centers at the forefront of worldwide innovation. According to a 2012 KPMG study that evaluates the competitiveness of total operating costs, Greater Montreal ranked second among the major metropolitan areas in North America specializing in aerospace.

Our support for the aerospace industry takes several forms. For example, we offer financial support for private investment projects, investment or research and development tax credits, and a tax holiday for major investment projects.

## **In terms of revenue, Quebec's aerospace sector has fallen in rank from 3rd to 5th globally. What steps will MEIE take to reverse this trend and to ensure the sector's long-term international competitiveness?**

As a matter of fact, the Quebec aerospace sector has never ranked third in the world. The four key players are the United States, France, the United Kingdom and Germany, all of which have a significant history in aerospace and invest heavily in the defense sector.

Thus, there is no trend to be reversed. On the other hand, Quebec wishes to maintain or even improve its position among the front-runners so it must remain vigilant in light of strong international competition, including that from the emerging countries, and en-

sure that our manufacturing SMEs adapt to changes in the worldwide supply chain.

It is also important to maintain support for the industry by enhancing risk sharing and through financial support for principal contractors, SMEs and research centers. I am thinking in particular of Aéro Montréal's MACH initiative, which seeks to bolster our supply chains, and the ecojet catalyst project, which is promoting collaboration and innovation.

## **What is MEIE's policy for granting tax credits and similar concessions to aerospace companies?**

The R&D tax credit policy is not specific to the aerospace sector, although it is one of Quebec's industrial sectors that benefit the most. Bearing in mind federal tax credits, Quebec's fiscal policy is among the most generous in the world. Furthermore, enhancements are possible if the R&D is conducted under industrial partnerships, by a consortium or R&D center in Quebec.

Lastly, I recently launched the Créativité Québec program, which targets businesses in all sectors that have innovative projects and are seeking financing to acquire new technologies or to develop or enhance products or processes.

## **Quebec has earned international acclaim for the quality of its aerospace human capital, but many companies have voiced concern over potential shortages of technically trained employees. How will MEIE support the development of its base of human capital?**

The Québec government supports manpower development by funding training establishments at the secondary, CEGEP and university levels. It also supports organizations that work directly with businesses to ascertain their qualitative and quantitative manpower needs. In this way, the MEIE supports the Comité sectoriel de main-d'œuvre en aérospatial (CAMAQ), which takes stock each year of manpower and training needs. Lastly, through Aéro Montréal, the MEIE promotes the aerospace sector to young people.

## **What is MEIE's vision for the future of Quebec's aerospace industry?**

The industry's future hinges on four key factors. First, we must promote the development of principal contractors in the sector. Second, we must round out the Quebec supply chain by attracting new first-tier equipment manufacturers and integrators. Third, we must foster broader competitiveness and productivity in Quebec SMEs. To this end, we must promote their consolidation and the automation of manufacturing processes. Lastly, the industry must remain at the forefront of technology by making innovation a genuine priority. •

# Suzanne M. Benoît

President and CEO, Aéro Montréal



*"A better alignment between customers and suppliers will inevitably result in the enhanced performance of the Quebec aerospace supply chain."*

## **Aéro Montréal binds Quebec's aerospace industry together. Please describe the rationale for Aéro Montréal's formation in Quebec in 2006 and some of its key milestones.**

The greater Montreal Region has long been home to a concentration of major aerospace companies, including four original equipment manufacturers or OEMs, as well as a significant network of smaller related companies and other stakeholders. In 2006, the industry and the three levels of government (federal, provincial and municipal) jointly put forth the concept of an industry cluster. The primary objective of Aéro Montréal was to establish a dynamic mechanism for consultation among its members so that the industry could develop to its full potential, continuously improve productivity and remain competitive globally. When Aéro Montréal was formed, the industry faced five major challenges that in turn led to the establishment of five corresponding strategic committees within the organization: Branding and Promotion, Human Resources, Innovation, Supply Chain Development, and Defence and National Security. In 2012, Aéro Montréal merged with the Association québécoise de l'aérospatiale (AQA), a kindred industry group. It was imperative that the cluster be highly inclusive. Today, Aéro Montréal boasts a broad membership of larger companies such as OMEs, as well as small and medium-sized enterprises (SMEs), universities, colleges, trade schools, associations, and unions.

## **Aéro Montréal's strategic committee on Supply Chain Development produced the MACH Initiative. Walk us through the emergence and development of this program.**

Aéro Montréal's Supply Chain Development Working Group mobilized more than 80 supply chain industry professionals between 2009 and 2011 to launch the MACH initiative, which is designed to accelerate the transformation of Quebec's aerospace supply chain and enhance its performance in a constantly evolving and globalized business context where OEM's are now mostly working with first-tier integrators.

There are roughly 15 first-tier suppliers in Quebec and some 200 aerospace subcontractors whose activities are largely determined by larger companies, such as Bombardier. Therefore, the MACH Initiative aims at intervening directly with suppliers to improve their performance while fostering collaboration and innovation within the chain to further develop a base of Tier 1 suppliers able to participate actively in future local and international aerospace programs, and to develop a base of SME subcontractors with distinctive competencies that are better aligned with OEMs and Tier 1 suppliers, who are more productive and that master best business practices and new manufacturing technologies (innovation).

At the heart of the initiative lies the MACH Excellence Framework, which is a management system and maturity matrix to help sup-

pliers assess their performance, identify performance gaps, and determine the actions necessary to improve and better position themselves within the supply chain. The MACH Excellence Framework also has a maturity scale of five levels, MACH 1 to MACH 5, which help evaluate to what extent a supplier masters the 15 key business processes of the framework.

Supply chains are never static; they form and reform according to the demands of each customer. That's why effective collaboration is so critical. The MACH initiative therefore encourages the establishment of special collaborative relationships between customers and suppliers that focus on the sharing of expertise and strategic information to increase pro-activity and innovation. A better alignment between customers and suppliers will inevitably result in the enhanced performance of the Quebec aerospace supply chain. As a result, each supplier that participates in the MACH initiative is accompanied in its efforts by one of its customer, which takes the role of sponsor. The sponsor agrees to support its supplier through a fixed number of pro-bono initiatives, something made possible because of a good client/supplier relationship.

To correct gaps identified via the audit process, a team of experts prioritizes and identifies specific solutions, which are then implemented by the supplier with help from consultants chosen by the very same supplier. One of the factors that has made the success of the MACH Initiative on the administrative level is that Aéro Montréal manages the various projects and disbursements to the participating companies. This approach contributes to the reduction of the paper burden (red tape) for the SMEs.

## **What is the significance of R&D to Quebec's aerospace cluster and what steps does Aéro Montréal take to promote innovation within the industry?**

The most telling figure is that 70 per cent of Canada's total R&D is performed in Quebec, with Quebec's aerospace cluster and its four OEMs having triggered substantial R&D. Companies within the cluster have developed strong research capabilities, in collaboration with universities and other stakeholders, an asset that has enhanced our ability to attract research projects.

A great example of R&D is the Coalition for Greener Aircraft catalyst project, SA<sup>2</sup>GE. This project was conceived by the Innovation strategic committee of Aéro Montréal, in conjunction with the Quebec government in 2009. In order to retain our strengths in Quebec, we needed to develop greener technologies meeting the new environmental regulations. In 2010, a budget \$150 million of private and public funding was allocated to the first phase of the project. More than 25 SMEs are currently working with OEMs on new technologies under the banner of SA<sup>2</sup>GE. •

# Denis Faubert

President and CEO, Consortium for Research and Innovation in Aerospace in Québec (CRIAQ)



*"CRIAQ is industry-led, and its primary goal is to stimulate innovation, collaboration and provide companies large and small with these benefits."*

**The Consortium for Research and Innovation in Aerospace in Québec (CRIAQ) was founded in 2002 with financial support from the Quebec government. Could you please provide us with an overview of the evolution of this organization from its inception?**

CRIAQ is a sectorial research cluster meant to support eight of our most important sectors. Among its industrial members, CRIAQ has four original equipment manufacturers (OEMs): Bombardier, Bell Helicopter, CAE, and Pratt & Whitney Canada. Being complementary aerospace companies, they drive the network without competing against each other.

One of the key requirements of our initiative was to integrate different sectors by bringing companies and people to work together. The launch of CRIAQ as a network was vital to create a robust and functional system, which had industry at its base and where research was an integral part. A vibrant and diverse community was built. One of the valued outcomes of this network is the production of highly qualified personnel. CRIAQ enables projects in universities and allows students access to an important resource that will impact their careers. CRIAQ's success is due to its exceptional leadership and the decisions that were made in its development.

**What is CRIAQ's mission in supporting Quebec's Aerospace Cluster?**

CRIAQ is industry-led, and its primary goal is to stimulate innovation, collaboration and provide companies large and small with these benefits. We support and finance projects which explore problems that the industry is facing and hold activities to bring people together to solve these problems collectively. Last year, our open innovation forum gathered over 1,000 people to discuss these issues.

The CRIAQ system was originally designed to transfer university research into industry. Most of the work has been done in universities under the guidance of professors and industry leaders. CRIAQ creates conditions which incubate innovation in universities and oversees the transfer of these technologies into companies.

**What is the composition of CRIAQ's community?**

Since CRIAQ's inception, we have had over 900 graduate students work on projects with over 650 researchers from universities. We benefit from a network of over 55 industry members and 25 universities and research centers.

Furthermore, over 75 percent of our industrial members are small and medium-sized enterprises (SMEs). SMEs are one of our main focuses, as we look at how we can help these companies leverage their technologies and resources in an effort to be competitive. SMEs participate in projects alongside larger companies. With

CRIAQ, SMEs have access to intellectual property and are able to participate in the innovation process and connect to important players in the field.

**What is the typical return on investment that companies are able to achieve through collaborating with CRIAQ on applied R&D?**

CRIAQ's operations have demonstrated the effectiveness of applied research and development (R&D). The ratio of return on investment (ROI) that an SME makes from our projects can be as high as one to 44. ROI is less for larger companies, ranging from a ratio of one to eight, so it is still quite substantial. Our network provides a cost effective method of conducting research.

**How many projects has CRIAQ implemented since its inception in 2002?**

CRIAQ currently has 110 ongoing and completed projects: 57 completed and 53 in progress. These projects represent a cumulative worth of \$107.6 million.

**What has been one of CRIAQ's recent projects?**

CRIAQ's 100th project was launched in 2014, whose goal was to develop additive manufacturing or 3D printing technology, to produce parts for the aerospace industry. We have 13 partners working on the project, some of whom are outside Quebec, as well as 10 students, whom receive practical experience from the project.

**Through its programs CRIAQ aims to cultivate young aerospace talent. How does the structure of your projects provide students with hands-on training?**

CRIAQ provides opportunities for students to collaborate on projects in universities and colleges. Montreal has the most universities in North America after Boston and many of its universities prepare students well for entrance into the aerospace industry. The structure of our programs allows students to practice problem solving skills. Moreover, we consult with universities to provide professional and industry training to students, and to teach them what to expect when they enter the workforce.

**R&D plays an essential role in ensuring the competitiveness of Quebec's aerospace cluster. What is your opinion on the government's role in providing incentives to the aerospace industry for R&D initiatives?**

While research is very expensive and time-consuming, it is vital for innovation and competitiveness. Aerospace is well supported because of its strategic partnership with the government. Defining strategic goals is an important feature for using funding effectively. •





Mechanic working on a PW119 engine on wing. Photo courtesy of Pratt & Whitney Canada.

# The Big Four

## *Drivers of Quebec's Aerospace Cluster*

The foundation of Quebec's aerospace cluster is built upon four corners: Bombardier, Bell Helicopter, Pratt & Whitney Canada (P&WC), and CAE. Each with distinct focuses, these original equipment manufacturers (OEMs) develop products that shape the global aerospace industry. Bombardier is considered to possess the world's most comprehensive aircraft portfolio, which includes business and commercial jets and specialized and amphibious aircraft. It ranks among the world's largest aircraft manufacturers and seeks to bolster its position with the upcoming entry of its CSeries commercial jet and Global 7000 / 8000 business aircraft.

Bell Helicopter is a world-leading manufacturer of rotary wing aircraft; its operations in Mirabel, Quebec are dedicated to producing the majority of its commercial helicopter lines. It was the first manufacturer to obtain certification for commercial helicopters, and since the opening of its Mirabel facility in 1986, has brought over 4,400 helicopters to market. Its investment in three new aircraft programs, including the light-class Bell 505 Jet Ranger X, super-medium class Bell 525 Relent-

less, and V-280 Valor for the U.S. Army's Future Vertical Lift Program, will reinforce its position as a global leader in the helicopter market.

P&WC is on the leading edge of engine technology. Its products address contemporary trends of reducing aircraft fuel consumption, noise, and emission levels. Throughout its 87-year history, it has produced over 80,000 engines, of which 50,000 are still in service, for a range of aircraft that include business jets, regional airliners, helicopters, and military aircraft. CAE is a global champion of flight simulation. In 1982, CAE developed the first simulator to receive Federal Aviation Administration (FAA) approval for commercial aircraft, which had a transformative impact on safety measures within the aerospace industry. Since its inception, the company has designed more than 45 innovative simulators for various types of aircraft, has delivered over 2,000 around the world, and continues to incorporate cutting-edge technology in simulators for the aerospace industry's newest aircraft platforms, such as the Airbus A450, the Bombardier CSeries and Global 7000

/ 8000. Complementing its simulators, CAE has cultivated a global network of 67 centers and flight schools that train over 120,000 pilots each year.

As world leaders in their respective fields, Quebec's OEMs have complementary specializations that lay the foundation for the local aerospace industry's breadth of expertise. Indicative of their latest products,

### Composition of Quebec's Aerospace Cluster

**4** Major Prime Contractors

**10** First-tier Equipment Manufacturers and Integrators

**190** Small and Medium-Sized Enterprises

Source: Ministry of Economic Development, Innovation and Export Trade (MEIE), Government of Québec

*"R&D investments are essential to strengthen our competitive positioning, as they enable us to proactively address societal needs and to seize emerging business opportunities. We are already seeing validation of those investments in our strong order backlog, which reached \$69.1 billion as of December 31, 2014."*

**- Alain Bellemare, President and CEO, Bombardier Inc.**

these players must continually invest in research and development (R&D) initiatives to sustain their presence in the global aerospace industry. "In every aspect of our business we are innovating faster and in more ways than ever before. Wherever you look, our industry is being challenged by the emergence of new technologies and game-changing improvements, all

pushing us beyond the boundaries of our traditional operating models," said Raymond Leduc, president of Bell Helicopter. As drivers of innovation, OEMs constitute the lion's share of Quebec's annual C\$700 million expenditure on aerospace R&D. In only the last 10 years, CAE has invested over C\$1.2 billion in R&D initiatives, while over the next 4.5 years P&WC has committed to spend C\$1 billion.

The seeds of these R&D efforts are flourishing as innovation is rampant within Quebec's aerospace cluster. Bombardier's upcoming CSeries commercial jet is expected to deliver a 20 percent fuel burn advantage while operating at a 15 percent reduced cost compared to other aircraft in its class. Bell Helicopter plans to integrate fly-by-wire technology, a staple in the fixed-wing community but otherwise not applied to rotorcraft, in its newest helicopters. The incorporation of fly-by-wire technology in helicopters is viewed as a game-changer. "It poses enhanced safety, performance, and reliability benefits," said Leduc of Bell Helicopter.

Maria Della Posta, senior vice president of Sales and Marketing of P&WC, said: "Investments in R&D and a willingness to push the boundaries is critical." A focus on applied R&D efforts have enabled P&WC to expand from a single-engine product to a 13-engine family today.

Quebec also benefits from a collaborative network of research institutions and universities. Serving as a bridge between academic and industrial sectors, CRIAQ projects assist OEMs in shouldering the burden of costly pre-competitive R&D efforts, while preparing the next generation for careers in aerospace. OEM participation in CRIAQ projects is extensive with P&WC and Bell Helicopter having participated in 26 projects and 19 projects thus far, respectively. CAE has partnerships with 20 universities and research centers in Quebec. "Through the concerted development of collaborative R&D programs, the local aerospace industry has gained credibility and visibility while developing a talent pool for the future," said Marc Parent, president and CEO of CAE.

While innovation certainly plays a critical role in shaping the competitive edge of OEMs, it is also crucial to translate these efforts into bottom line results. In an effort to enhance quality and drive down costs, OEMs are taking steps to increase the competitiveness of their local supply chains. In an effort to spur supplier development, Aéro Montréal, an inclusive association of industry members, instituted the MACH initiative in 2011, which serves as a framework for encouraging the continual improvement of local suppliers.

The MACH initiative is based upon three principals: to create an improved business culture for more openness, collaboration, and innovation; to improve supply chain competitiveness, one company at a time; and to develop new local integration capabilities. Although OEMs and tier-one integrators have long established their own supplier development programs, the MACH initiative serves as a comprehensive benchmarking system that consolidates aspects of each preexisting program. There are currently 40 companies participating in the program, with plans to scale its membership up to 50 by spring 2015.

Given the transition that is currently underway in which OEMs are displaying a heightened tendency to work with robustly integrated suppliers, the MACH initiative creates a transparent and collaborative environment for suppliers to develop their capabilities in accordance with the needs of OEMs. •



*A simulator in the CAE-Emirates training centre in Dubai, UAE. Photo courtesy of CAE.*

# Alain Bellemare

President and CEO, Bombardier Inc.



*"Our top priority for the next several years will be translating our investments into sustainable bottom-line results."*

## **As one of the world's leading aircraft manufacturers, Bombardier plays a significant role in driving the dynamics of Quebec's Aerospace Cluster. How has Bombardier's relationship with Quebec's aerospace supply chain evolved over the past decade in support of its position within the global aerospace industry?**

At Bombardier, we value our supplier relationships because we know that their capacity to deliver world-class products efficiently and at a competitive cost is a condition of our success.

In Quebec, we have been a main sponsor and key mentor of the MACH initiative from Aéro Montréal, since it was launched in 2011. The MACH initiative provides training, continuous improvement and business development support to Quebec aerospace suppliers. It focuses on three main priorities: excellence in leadership, excellence in operations and excellence in planning and human resource development.

In addition to helping local suppliers scale up, we also support them in expanding their customer base. For instance, we share information on our own supplier base, we communicate our procurement strategies through active participation in industry associations and we encourage our suppliers to contact other aerospace companies in order to generate new business opportunities.

## **What steps need to be taken by players across the local aerospace value chain in order to bolster the province's global competitiveness?**

A first step would be to better understand new trends in aerospace manufacturing and the evolving requirements of original equipment manufacturers. In parallel, local players should continue to focus on quality, productivity and cost-competitiveness. This can be done through investments in automation to develop their capacity to manufacture more complex products or the implementation of lean techniques to reduce waste. Another crucial step is to study market dynamics to determine how they should position themselves in this new competitive landscape where emerging players are a force to be reckoned with.

## **Last year, Bombardier announced a significant restructuring of its aerospace division, segmenting its activities under three business units: Business Aircraft, Commercial Aircraft, and Aerostructures and Engineering Services. What was the strategic rationale for this shift?**

The July 2014 reorganization was all about getting more focused on execution. We put in place a lighter, nimbler structure that will give us more transparency across the company, allowing us to more readily identify and remove obstacles to operational efficiency. This will improve our capacity to answer current challeng-

es and evolving customer needs, as we will adjust more quickly. The new structure will also position us to fully benefit from the tremendous growth potential associated with the upcoming entry into service of our new products: the CSeries commercial jet, the Global 7000 and the Global 8000 business aircraft.

Additionally, the Aerostructures and Engineering Services business segment will enable us to further market our expertise in this field to the aerospace industry, thus generating new revenues. Aerostructures and related aftermarket services currently represent a \$60 billion market, with forecasted annual growth of 3 percent until 2023. We want to capture a larger share of that market and we have the right tools to succeed, following our recent investments in advanced composite and metallic aircraft structures, including fuselages and wings.

## **Over the next 20 years, commercial aviation forecasts predict delivery demand orders of 13,100 new aircraft for the 20-149 seat market segment. How will Bombardier utilize its entirely new designed CSeries, CRJ Series, and Q-Series aircraft to capitalize on this market potential?**

The CSeries aircraft was designed specifically for the 100- to 149-seat market, which is expected to generate delivery demand for 7,100 aircraft worth \$465 billion over the next 20 years. It provides operational flexibility, being able to take off on shorter fields and benefiting from an extended range compared to competitors in the same category. Most importantly, it offers a 20 percent fuel burn advantage and a 15 percent operating cost advantage over in-production aircraft in its class. The arrival of this new-technology, clean-sheet aircraft will challenge previous-generation aircraft, enabling us to capture a significant portion of the demand in this segment.

The CRJ regional jet family is uniquely positioned to match market demand within the 60- to 99-seat segment, which will see substantial growth from 2014 to 2033 with delivery demand for 5,600 aircraft worth \$185 billion. The CRJ NextGen aircraft is already recognized for its cost leadership due to its optimized aerodynamics and engine thrust, its lightweight design and its low maintenance costs. Our vision is to make it even more competitive, thanks to additional improvements that should result in a double-digit fuel burn reduction by 2020.

In the same segment, the Q400 NextGen aircraft now offers superior capacity with up to 86 seats, true dual class experience and a new cargo-passenger "combi" variant launched last year, which allows airlines to maximize revenue. With the lowest seat-mile costs in the short-haul regional market and jet-like speed, the Q400 NextGen turboprop is best suited to replace 20- to 59-seat aircraft and should remain a market leader in the 60- to 99-seat segment. •

# Raymond Leduc

President, Bell Helicopter Textron Canada



*"We export nearly 95 percent of our products, so the helicopters we assemble in Canada truly end up across the globe."*

## **Bell Helicopter established its operations here in Mirabel in 1986 and now produces the majority of Bell's commercial helicopter lines. Can you talk to us about the role of Bell's Mirabel facility in its overall global operations?**

Mirabel is home to Bell Helicopter's largest commercial assembly facility. Today we cover 660,000 square feet on 152 acres of land, and are equipped with two runways and a control tower. Since we first opened our doors here in Mirabel, we have produced some 4,400 helicopters. We have a fleet size of more than 900 commercial aircraft used by more than 300 operators in the region. We export nearly 95 percent of our products, so the helicopters we assemble in Canada truly end up across the globe. We have a strong product portfolio and see a significant and vital role for our Mirabel plant in the years ahead.

## **These 429 models will replace the Coast Guard's existing BO-105 fleet. How will these new state of the art helicopters improve the operations of the Canadian Coast Guard?**

The Canadian Coast Guard deserves the best equipment available, and we are honored to provide them with that. These men and women fly incredibly varied and important missions on our behalf every single day and work hard to protect all of us here today. They have desperately needed modern aircraft designed to operate safely in some of the harshest flying conditions on the planet and now they have it with the Bell 429. The Bell 429 gives the Canadian Coast Guard the most-advanced light twin helicopter in the world certified by the latest airworthiness safety regulations. Now, they have true single pilot instrument flight rules, outstanding single engine performance, and the ability to carry more, travel faster, and stay in the area longer and, most importantly, return from each mission safely. In addition to all of these great performance characteristics, the Coast Guard gets the best product support possible. Bell Helicopter has been recognized for two decades as the top-rated customer service and support OEM in the world by Professional Pilot Magazine and other third parties and we take this rating very seriously. We have a strong team of dedicated professionals ready to support the full lifecycle of every helicopter we make.

## **In November 2014, Bell completed the maiden voyage of its 505 Jet Ranger X in Mirabel to much acclaim. Can you talk to us about this new aircraft and your expectations for it when it becomes available in 2015?**

*"Customers around the world are looking to us to continue advancing vertical lift technology to meet their evolving needs."*

The Bell 505 Jet Ranger X will be the most cost-competitive, capable light helicopter in its class. By working with our partners like Turbomeca and Garmin, the Bell 505 will bring customers safety enhancements like a dual-channel FADEC with a backup and a standard glass cockpit with fully integrated avionics to increase pilot situational awareness – all wrapped around a proven rotor and drive system. First and foremost it was imperative that we understood exactly what our customers needed. Who better to tell us than the people who are flying the aircraft every single day? Enter the Customer Advisory Council (CAC). The Bell 505 was driven directly by feedback and input from our customers. And customers are responding. We now have close to 300 letters of intent for the Bell 505.

## **Reignwood, a Chinese enterprise recently committed itself to purchasing sixty 505 Jet Ranger Xs for travel and tourism purposes. How important are the Chinese and Asian markets for Bell Helicopters?**

As China's airspace continues to open to commercial aviation, helicopter deliveries will continue to climb. China has one of the fastest growing civilian helicopter fleets in the world. We are on the right path towards great opportunities ahead with our innovative products, such as the integrated glass avionics system offered across all of our current product line. From an overall industry standpoint, we expect continued investment in training schools and training school aircraft in China, as there remains a lack of instructors, pilots and maintainers. Economic growth will continue to drive demand for helicopter transportation, especially in the corporate/VIP segment. China's investment in helicopters that provide governmental services, including disaster relief, should continue.

## **What does Mirabel and Montreal have to offer to major aerospace manufacturers like Bell Helicopters?**

In addition to airframe design, product development, composite manufacturing, integration, and product support, our facility in Mirabel also performs flight-testing and certification. The combination of our world class facility and talent pool in the region, makes for really great opportunities. Our employee's passion for innovation, their commitment to quality and engagement in providing the best support has been essential to our success here in Canada. There's an incredible amount of talent in the region and there are several high level academic institutions that we have really great relationships with. Additionally, we have a Textron leadership development program where recently graduated students can move through various Textron divisions. We are committed to attracting the best and brightest to Bell Helicopter. •

## Maria Della Posta

Senior Vice President, Sales and Marketing,  
Pratt & Whitney Canada



*"P&WC's sustained R&D investments enable the company to continue to develop the next generation of small, medium and large turbofans, turboshaft and turboprop engines."*

**Founded in 1928, P&WC is recognized as a global leader in aerospace for its high-technology engines. To begin, walk us through the evolution of P&WC and describe any recent milestones that have contributed to its current positioning within the global aerospace industry.**

For over more than 85 years, P&WC has produced over 80,000 engines, more than 50,000 of which are still in service with 10,000 operators in 200 countries. P&WC's engine fleet, powering business jets, general aviation and utility aircraft, regional airliners, helicopters, and military aircraft, has accumulated more than 650 million flying hours. P&WC has built one of the most comprehensive support networks in the industry, including service centers around the world, strategically located field support representatives and mobile repair teams, 24/7 Customer First Centers and a rapidly expanding offering of online customer services. Every second, a P&WC-powered aircraft takes off or lands somewhere in the world. P&WC's engine families have grown to 13, allowing the company to make major inroads into all the markets mentioned above.

At the same time, the company transformed the way it developed, manufactured and supported its products, adopting leading techniques, such as LEAN and Achieving Competitive Excellence (ACE) operating systems to gain step changes in productivity and quality. These changes were accompanied by the acquisition and opening of facilities in Poland, China and elsewhere to enhance access to new markets and benefit from global talent. P&WC's development programs are also supported by substantial investments in R&D and advanced manufacturing technologies, as well as innovative engine demonstrator programs and collaborations with leading universities, research centers, suppliers and partners. P&WC is committed to leveraging advanced technologies for a new generation of engines, including the next-generation regional turboprop (NGRT) and the PurePower® PW800. We are also continuing to enhance the performance of the PT6, still the most popular engine in its category after half a century. At the heart of P&WC's success are its dependable people and its drive to continually improve and reinvent itself.

**Over the last 10 years, P&WC has invested an average of \$450 million in R&D initiatives. In the coming years, how will P&WC focus its R&D efforts in order to sustain its presence as a world-leading engine manufacturer?**

P&WC focuses its research on an array of disciplines, such as aerodynamics, materials, combustion, cooling and acoustics. There is an increasing focus on computational design methodologies as a technological development in their own right because these allow the design of products that make the best use of P&WC's technology portfolio. At the same time, there is an effort to develop manu-

facturing processes that reduce production costs as this allows P&WC to offer more sophisticated engines at competitive prices. Sustainability is a key driver of its innovation efforts. P&WC's priority is to continue to offer engines with game-changing reductions in fuel consumption, noise and emission levels; and to manufacture and service them using sustainable processes and more ecological materials. Ensuring that its products are designed, produced and operated while minimizing environmental impacts throughout their life cycle is a top priority.

In this regard, P&WC's latest R&D programs include cutting-edge materials such as composites and advanced alloys to improve engine weight, a high-efficiency compressor technology to enhance engine performance and reduce fuel consumption, and further improvements to combustion systems, to reduce engine emissions. P&WC's sustained R&D investments enable the company to continue to develop the next generation of small, medium and large turbofans, turboshaft and turboprop engines.

Over the next five years, P&WC will invest in new technologies, including: the development, evaluation and certification of new materials, including composites, high strength alloys and coatings to reduce engine weight (a lighter engine results in lower fuel consumption); the design and development of new high pressure, high efficiency compressor modules to enhance engine performance and help reduce fuel burn; the development of combustion system technologies to further reduce engine emissions to levels significantly below the expected upcoming regulations; noise reduction technologies; and advanced manufacturing technologies including technologies required for intelligent cells.

**Please provide our international readership with a final message related to P&WC.**

This capacity to innovate, both from a technology and business perspective, has enabled P&WC to grow from a single-engine product, the PT6, to a 13-engine family today, with an estimated 25,000 new engines set to enter the market by 2020. P&WC has certified 100 new engine models over the past 25 years – an industry record. Early in 2015, P&WC celebrated its 85,000th engine delivery. P&WC's sustained commitment to innovation will help the company to continue to offer engines with game-changing reductions in fuel consumption, noise and emission level – and to manufacture and service them using sustainable processes and material. P&WC is also investing in enhancing its customers' experience in the aftermarket. For over more than 85 years, P&WC has developed one of the best engine and service portfolios and loyal customer bases in the industry. P&WC's team is now focused on preserving this remarkable legacy and market leadership while building the future for generations ahead. •

# Marc Parent & H el ene V. Gagnon

MP: President and CEO

HVG: Vice President, Public Affairs and Global Communications, CAE



**Founded in 1947, CAE is a global leader in modeling, simulation, and training for civil aviation and defense industries. To begin, provide us with a brief history of CAE and describe any recent milestones that have shaped its presence in the global aerospace industry.**

CAE was founded in Montreal in 1947 by Ken Patrick, an ex-officer of the Royal Canadian Air Force. His vision was to create an innovative company focused on technology. CAE received its first ever simulator contract in 1952 from the Canadian Defense Forces. In the following years the company obtained more simulator orders from defense forces, including NATO, as well as contracts from airlines. The 70s were important for the growth of our company, world airlines were hit hard by fuel shortages and environmental concerns so they turned to simulation to train their flight crews. In 1982, CAE reached an important milestone, its Boeing 727 simulator for United Airlines became the world's first commercial simulator to receive a new FAA (Federal Aviation Administration) approval, which meant that it was so realistic that all the training could be done in the simulator. That was a major breakthrough for the industry and for safety. By the end of 1990s we became the global champion of flight simulation – for both civil and military aircraft and decided to enter a much bigger market: training. We opened our first training centers in the early 2000s. Today, we operate 67 training centers and flight schools and train more than 120,000 pilots every year. Our customers come from 190 countries and include more than 3,500 airlines, aircraft manufacturers and operators as well as the defense forces of more than 50 nations. In 2009, we decided to leverage our simulation and training expertise in a new and growing market, health care. In just five years we became the world leader in simulation technology for healthcare with more than 9,000 simulators in operation worldwide.

**How have the capabilities of Quebec's Aerospace Cluster contributed to CAE's ascendance within the global aerospace industry?**

CAE's history and success are closely tied to the growth of the aerospace industry in Quebec and Canada. In addition to major aerospace companies like Bombardier, Pratt and Whitney Canada, Bell Helicopter, to name a few, Montreal has more than 200 small and medium-sized firms that make components and parts and provide services to major manufacturers. Their success is vital to our success. And that's without counting international organizations like IATA and ICAO that are based in

Montreal and that add great credibility to our city as a key aerospace player.

**How many simulators has CAE sold worldwide; what is the range of flight simulators that CAE is currently developing for new aircraft platforms; and what will be some of their key features?**

I'm very proud to tell you that the majority of commercial pilots flying around the world have either trained in one of our centers or on simulators designed and built by CAE in Montreal. As a matter of fact, we've delivered over 2,000 simulators and training devices around the world, which is the lion share of our industry. We have designed world's first simulators of more than 45 aircraft types, from the world's smallest business jets to the world's largest airliners like the Airbus A380. Most recently, we developed training solutions for the Airbus A350, Bombardier's new CSeries and Global 7000, 8000 business jets. For the military, we are jointly developing with Boeing the simulators for the U.S. Navy's new maritime patrol aircraft, the P8 Poseidon, and we are part of a team for the sales of the U.S. Navy's MH-60R naval helicopter.

**What is CAE's strategy for expanding its global presence in these regions?**

CAE has a well-established position in emerging markets. We have been active in India for over 40 years, in the Middle East, South East Asia and Latin America for more than 30 years, and in China for 25 years.

A key tenet of our strategy is establishing partnerships with our customers and having our people work on the ground, next to our customers, speaking their language, living their culture. In Dubai for example, where we train more than 10,000 pilots a year, we have a 13-simulator center with our partner Emirates and we opened a second center last year. Another example is China where we operate one of the largest centers with our partner China Southern; it is equipped with 24 simulators and more than 20,000 pilots train there every year.

This year, we are proud to have signed a joint venture agreement with Japan Airlines to provide flight crew training services across Northeast Asia. As part of the agreement, the airline will conduct all its training at the CAE-JAL joint venture. We are also proud to have renewed our long-term outsourcing agreement with Iberia for another 10 years and to have formed a new joint venture for pilot training services with China Eastern Airlines. •



CF-18 Maintenance. Photo courtesy of L-3 MAS.

# The Consolidation of Quebec's Aerospace Supply Chain

## *Suppliers and the Path towards Integration*

Globally, aerospace supply chains are undergoing a period of considerable transition. In the past, prime contractors relied upon an extensive network of integrators and sub-tier suppliers to feed their final assembly lines. This relationship is changing, though, as OEMs are taking concerted efforts to consolidate their base of suppliers, displaying a heightened tendency to grant long-term contracts, almost exclusively, to large-scale suppliers with robust capabilities. As the direct channel between prime contractors and sub-tier suppliers weakens, integrators have emerged as the primary conduit linking these groups.

Quebec's aerospace cluster benefits from a suite of roughly 15 diversely specialized integrators. This class of supplier has expertise in complete systems installations in fields as varied as aerostructures, avionics, cabin interiors, engines, and landing gears. An array of sub-tier suppliers supports these activities by engaging in distinct niches of manufacturing and sub-assembly. Given the industry's transition towards consolidation, it is becoming increasingly important for suppliers to demonstrate an integrated supply chain with comprehensive capabilities. Accordingly, suppliers within Quebec's aerospace cluster are investing in process improvements and considering avenues of organic growth, acquisition, and partnership in an effort to bolster their potential as competi-

tive suppliers within the local and global aerospace markets.

With the emergence of low-cost manufacturing centers abroad, it is critical that suppliers refine their manufacturing processes while adding value. Supplier development programs, such as Aéro Montréal's MACH initiative, encourage suppliers to adopt best practices while providing a framework in which they can monitor their continuous improvement. The MACH initiative also sparks collaboration and innovation within the local supply chain, lending to the further development of integrators and sub-tier suppliers that are better equipped to address the needs of the industry's prime contractors.

While suppliers are taking strides to refine their processes, it is equally important that they expand their capabilities. "Major players are looking to work with suppliers that are financially credible and able to share risk," said Hugue Meloche, president and CEO of Meloche Group.

This train of thought is pervasive amongst sub-tier suppliers and has triggered their goal of climbing the aerospace value-chain through vertical integration. The development of integrated abilities is a key determinant of a supplier's ability to provide value-added solutions. At the apex of vertical integration is design capabilities; a segment exclusive to the industry's most robust suppliers. Chris O'Neill, president and

chief operating officer of Mecaer America, said: "Everyone within the industry talks about design-integration, yet there are few companies in Quebec that have successfully moved from manufacturing into design." Sub-tier suppliers that typify this call to action include Meloche Group and NSE Automatech. The former was initially a machine shop that entered the aerospace industry less than 10 years ago, and has since integrated its capabilities to include engineering, special processing, and sub assembly. NSE Automatech, meanwhile, undertook significant investment in the construction of a new facility and has expanded its offerings in machining, surface treatment, electrical integration, and sub-assembly. "If you want to grow in the aerospace industry," said Christian Delisle, president of Electro-Kut, "you have to develop these capabilities." Accordingly, Electro-Kut has integrated sub-assembly work within its machining operations.

Quebec's suppliers have also explored acquisition as an avenue of integration: Avior Integrated Products expanded its portfolio of value-added solutions by acquiring companies specialized in machining and mechanical assemblies; Alta Precision became a stakeholder of Tekalia Aeronautik, a special processing shop, to incorporate this process within the production of its landing gear components; and Héroux-Devtek has touted its interest in acquir-

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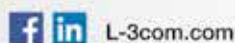
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ing complementary manufacturers that have strong intellectual property rights in order to strengthen its profile of landing gear offerings.

Partnership agreements allow suppliers to leverage the competitive offerings of tier-1s and OEMs to attract larger contracts. As Jacques Comtois, vice president and general manager of L-3 MAS, said: "Quebec's aerospace cluster is uniquely positioned in the global aerospace community. It is highly integrated and its members embrace this approach. While we might compete against each other for a contract, we can easily become partners on another contract."

Despite the dynamic composition of Quebec's aerospace cluster, suppliers will need to continue to focus efforts on R&D in order to sustain their competitive edge in the global market. Commenting on this trend, Solange Fresneau, vice president of TechFab, said: "R&D will be what differentiates us from emerging low-cost markets."

Automation in particular will play a critical role as Quebec's suppliers seek to distinguish themselves from low-cost competitors abroad. General Electric Bromont has led the vanguard beginning in the late-1990s for incorporating automation into its manufacturing processes by collaborating with Montreal-based firms who specialize in vision and robotics like AV&R.

Today, it has over 120 robots installed to undertake repetitive tasks and otherwise at-risk, non-ergonomic movements. "This has led to sustained productivity increases in excess of 7 percent annually," said Alain Ouellette, director of robotization of General Electric Bromont. Further to this success, Zodiac Aerospace has also collaborated with Montreal-based companies AV&R and Excel Finishing Product to develop a robot for automatic sprayer finishing. Through local collaboration, these players have the ability to improve their manufacturing capacities.

As the global aerospace industry is transitioning to favor consolidated supply chains, comprehensive suppliers, and advanced manufacturing practices, Quebec's aerospace cluster has evolved in stride. The capacity of local suppliers to adapt to the expectations of prime contractors reaffirms Quebec's position as one of the world's leading hubs for aerospace activity. •



# Jacques Comtois

Vice President and General Manager,  
L-3 Communications MAS



*"L-3 MAS is able to take an entire aerostructures package, design it, provide proof of concept, and manage the entire production process from sourcing, including manufacturing in-house to final assembly."*

**Although L-3 MAS was founded in 2003, its history dates back much further. To begin, please provide us with a brief overview of the establishment of L-3 MAS and its presence in Quebec.**

L-3 MAS was created when its parent company, L-3 Communications (L-3), acquired Bombardier Defense Services in 2003. Bombardier Defense Services was a specialist in the in-service support of the CF-18, a focus that remains at the core of L-3 MAS' operations today. A key milestone for L-3 MAS was the acquisition of the CF-18's data package, which allowed us to modelize and develop repair capabilities for the life extension of the aircraft. Consequently, over the last 27 years L-3 MAS has positioned itself as a world leader in terms of experience, knowledge, and skill on the F/A-18 aircraft maintenance and life extension.

**In the last five years, L-3 MAS began to diversify its portfolio of activity, entering into the commercial aerostructures and aircraft services market. What was the rationale for this move and what solutions do you provide this market today?**

We have known for some years that the F/A-18 was approaching the end of its service life, which would cause significant gaps in our business volume. Consequently, we needed to leverage our core strengths and diversify our business portfolio. Our expertise was in aircraft structures for the military market, so we decided to apply this know-how to the commercial aerostructures and aircraft services markets. We began in 2009 with a contract for Pratt & Whitney Canada to design, manufacture, and certify a test pylon for one of its new engines, to be adapted to its flying test bed. Initially, this was a challenge for our engineers to design a new structure, but it fell in line perfectly with our expertise. We have one of the biggest engineering departments in Canada, close to 200 engineers and technologists; this, coupled with the knowledge of maintaining aircraft structures for 27 years, has allowed us to develop maintenance tools, robotics, and strong engineering expertise. Furthering our move into the commercial aerostructures and aircraft services market, we recently opened a facility in Mexico, which enables us to manufacture at a very low cost. This is how we can distinguish ourselves in the market today: we have engineering power in Quebec, the L-3 name, and low-cost manufacturing capabilities abroad.

**What type of commercial projects does L-3 MAS concern itself with?**

L-3 MAS is able to take an entire aerostructures package, design it, provide proof of concept, and manage the entire production process from sourcing, including manufacturing in-house to final

assembly. Some of our projects are for renowned Canadian and international customers and range from a tier-1 role (which could include risk sharing) with large aircraft OEMs to a tier-2 role with local and international customers. When it comes to manufacturing and assembly, it is more difficult to compete with build-to-print specialists, but if our customers want a turnkey product, we can efficiently provide the entire design-to-build solution. Based on this expertise, within five years we want to be recognized as a leader in the commercial aerostructures and aircraft services markets just as we are in the military market.

**What role does research and development (R&D) play in L-3 MAS' overall strategy?**

Robotics and technical publications are two core focuses of R&D for L-3 MAS. During our 27-year tenure maintaining the CF-18, we have developed advanced capabilities in robotics, and we are purchasing a new robot this year. These robots are used either for repetitive tasks or to perform precise repairs in very limited spaces.

We are also a world leader in technical publications for the aerospace industry. Our Interactive Electronic Technical Manual (IETM) Viewer is compliant to the S1000D specification, the latest and greatest standard for technical publications and also supports other publication standards. IETMs replace written manuals for aircraft maintenance and operations and are accessible through desktops, laptops, and tablets. Our IETM solution provides advanced features, including search abilities, wire tracing, and interactive Illustrated Parts Breakdowns (IPBs). We develop IETMs for new aircraft and also provide turnkey solutions for the conversion of legacy manuals. Our current IETM Viewer works on Windows tablets and our next release coming out this year will work standalone on iPads. Our next R&D project is to investigate the feasibility of leveraging our IETM technology with augmented reality (Google 3D glasses).

**Quebec's aerospace cluster has recently fallen from third to fifth globally in terms of aerospace revenues. What steps need to be taken to ensure that the cluster remains competitive on a global scale?**

Quebec's aerospace cluster is very skilled and passionate, but it seems difficult at times to gain traction with the government. While the government realizes the importance of aerospace to its economy, it could do even more to support the industry's growth. R&D incentives are imperative to ensure the cluster's continued competitiveness. Even without direct subsidization or investment, there are many things that the government can do to support the growth of its aerospace industry. •

# Christian Sauvé

Vice President and General Manager,  
RTI Claro, Inc.



*"Titanium offers good growth potential so we will continue developing this side of our business to include areas such as the assembly of titanium parts."*

## **RTI Claro is a specialist in the field of titanium technologies. What is the significance of titanium and its application to the aerospace industry?**

Throughout the evolution of large aircraft, its composition has grown to include an increasing amount of titanium, a key example being the 787. As aircraft manufacturers strive to identify lightweight solutions, titanium is often paired with composite materials in order to strengthen an aircraft's structural integrity. In recent years, the industry has shifted away from solely using aluminum to a mix of aluminum, composite, and titanium. RTI Claro benefits from the extensive network of its parent company, RTI International Metals, as it is a specialist in titanium technologies. RTI Claro is a fully integrated aerospace manufacturer focused on the production of medium and large structural airframe components as well as mechanical assemblies, using aluminum and titanium.

## **RTI Claro recently moved to new facilities. Could you tell us about this move and its key features?**

RTI Claro moved into its current 180,000 square foot facilities in mid-2007. The facilities feature state of the art, high-speed five-axis machines, assembly and surface treatment capabilities, in which we continually invest. Our engineers also work with all of the latest software, which enables them to handle 3D models

from our OEM customers. Overall, we work with the same tools as the OEMs, but being a smaller company, we are afforded enhanced response time and agility in what we do.

## **How does RTI Claro differentiate itself from other aerospace manufacturers?**

There are many companies in the aerospace sector capable of machining titanium, but where RTI Claro differentiates itself is in its ability to come to the table with complete solutions. From design to assembly, we are a fully integrated company, which allows us to influence the design of our customers' products. We can challenge them to change the raw materials or the manufacturing processes that they work with, and, in some cases, reduce the amount of work and material that goes into transforming our customers' design into finished products. This is an area in which we have a competitive advantage over other companies.

## **How has RTI Claro performed in terms of recent growth?**

Since RTI Claro moved into its new facilities, it has experienced substantial growth. Between 2009 and 2014, we have seen our sales grow tenfold. This has led us to achieve 50 percent annual growth in each of the last two years, a trend that we expect to continue through 2016.



*Assembly pedestal. Photo courtesy of RTI Claro.*

**To what do you attribute these strong growth figures?**

RTI Claro has developed good relationships with its customers, and consequently, existing customers keep coming back and asking us to do more for them. This has played a significant role in accelerating our growth. We have been lucky to be involved in a number of successful programs, such as the 787, which has boosted our activity to encompass 10 or more aircraft each month. Looking forward, we want to expand our business and take on new customers. Also, key to our success is our willingness to invest in supporting our customers, and we are currently evaluating what is the next investment that we need to make to continue our growth.

**RTI Claro is an active company in Aéro Montréal's MACH program. Tell us about your involvement in the program and the role that it plays in strengthening Quebec's aerospace supply chain.**

Each OEM has their own custom programs that they use to develop and manage their suppliers. With the MACH program, rather than working on multiple programs in parallel, companies are able to focus on one system that will fulfill the requirements of all of the OEMs. We have found that MACH is a more comprehensive business wide solution than some of the OEMs more focused sys-

tem. RTI Claro was initially rated as a strong MACH 3 supplier and reached MACH 4 in early 2013. Several months from now, we hope to achieve MACH 5 status.

**Over the next three to five years, what are some of your goals, and where would you like to see RTI Claro positioned in the market?**

Looking forward RTI Claro wants to further integrate itself and enhance its capabilities to handle more complex and larger assemblies. Titanium offers good growth potential so we will continue developing this side of our business to include areas such as the assembly of titanium parts. We also want to propose solutions to our customers that will reduce the cost of their design and products, and then the next step will be to take design responsibility. The focus will initially be on titanium products because that is where, with RTI International Metals being a fully integrated titanium solution provider capability, we bring a unique expertise. We want the whole RTI Claro experience to be about being able to complete challenging or critical projects that few are able to support to the level desired by the OEMs or Tier I. With this in mind, our short to medium-term goal is to be a high value innovative integrator of products and services to the global aerospace and defense industry. •

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ADVANCING TITANIUM

# Stephen Kearns

President and CEO,  
Avior Integrated Products



*"Avior has recently experienced rapid growth: three years ago we averaged annual sales of \$20 million, whereas today we are over \$50 million."*

**Avior Integrated Products was founded in 2002 and has since realized a significant transformation in its range of capabilities. To begin, please walk us through the evolution of Avior and its presence in Quebec's Aerospace Cluster.**

The genesis of Avior Integrated Products' (Avior) operations was focused on sheet metal fabrication. Over the years, we have developed our position within the Cluster through the expansion of existing operations and through the strategic acquisition of companies specialized in machining and mechanical assemblies. Through this expansion process, we have developed a more robust product portfolio, and became an integrated supplier of lightweight hybrid composite structures and mechanical assemblies for the aerospace industry. As we developed Avior's range of product offerings, we also began to cultivate a strong team of engineers focused on design-to-build processes. This development allowed us to bind our product areas together in an effort to provide optimized weight and cost solutions to our customers, and also had the effect

of completing our transformation as an integrator.

**As Avior completed its integration, what was its first design-to-build project?**

Avior's first design-to-build project was in 2005, in which we leveraged our metal fabrication and composite expertise for Honeywell on the A380. Honeywell was in need of lightweight power supply enclosures and they approached us for a solution. Working on the A380 was a significant milestone, as it helped to develop our core team of engineers and showcased our design capabilities. The development of design processes has been critical to our growth: it has allowed us to take a more proactive approach with customers on new aircraft programs and has brought more business opportunities.

**Tell us about one of Avior's past projects and the utilization of its integrated services.**

Avior worked closely with Boeing to seek cost and weight reduction solutions in

the manufacture of the vertical fin fairing for its 787 aircraft. Each iteration of Boeing's 787-platform goes through design changes in an effort to optimize costs and performance. As Boeing implements these changes, we utilize our design and cost reduction abilities to actively work with them in the process.

**How has Avior fared in terms of recent growth?**

Avior has recently experienced rapid growth: three years ago we averaged annual sales of \$20 million, whereas today we are over \$50 million. There was an acquisition that contributed to this figure, but we also grew organically through new business on value-added structures such as on Boeing's 787 and Bell Helicopters 429. Overall our strategy is to keep 60 to 70 percent of business dedicated to the production on the new generation of aircraft. We recently secured business on the Boeing 737 Max and 777 programs as well as the Bombardier Global Express 7000 and 8000, which is important because these are high rate programs that are early in their production life cycle.



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# Charles Magnan

Vice President Sales and Engineering,  
Mecachrome Canada



*"Mecachrome specializes in manufacturing large, complex parts, many of which are critical to an aircraft, such as pylons, engine mounts, wing skins, and nose landing bay structures."*

## **Mecachrome is a multinational company with deep roots in the aerospace industry. To begin, tell us about the evolution of Mecachrome's presence in Canada and how these operations tie into Mecachrome's global network.**

Mecachrome was founded in 1937 in France and has since expanded its international presence in Europe, North Africa, and North America. Internationally, Mecachrome's operations are focused on the design, manufacturing, and assembly of value-added parts and assemblies for the aerospace, automotive, motor sports, defense, energy and medical sectors. As part of Mecachrome's strategy for diversification and regional expansion, in 2004 it established offices in Canada dedicated to servicing the North American market for aerostructures. Mecachrome's mission in the Canadian market is to further cultivate its machining capabilities, while exploring avenues of vertical integration and becoming a tier-1 supplier. In recent years Mecachrome has developed expertise in design-to-build engineering, working with customers e.g.: Middle River Aircraft Systems, Aerolia, and GE Aviation, and will continue to pursue design projects going forward. Another way in which Mecachrome is pursuing vertical integration is by aligning itself with small forging houses and suppliers of raw materials.

## **What are some of the specific aerostructure products that Mecachrome manufactures in Canada?**

Mecachrome specializes in manufacturing large, complex parts, many of which are critical to an aircraft, such as pylons, engine mounts, wing skins, and nose landing bay structures. The machining process is complex as it is made of particular alloys.

## **Tell us about Mecachrome's work in Canada. What is the breakdown of your facilities and workforce?**

Mecachrome has 200 employees in Canada, with a dedicated team of engineers. Our facilities include a large number of gantry machines with over 50 spindles spread throughout 170,000 square feet of production space. The scale of our facilities allows us to handle long parts, both titanium and aluminum. We have an area for inspection, quality assessment, deburring, and painting. Automation has yet to play a dominant role in the machining of large parts, but looking forward, we would like to develop this aspect of our manufacturing processes.

## **How significant is collaboration in Quebec's aerospace cluster to Mecachrome's overall operations?**

Mecachrome works in partnership with several integrators in Quebec's aerospace cluster. While we focus on the manufacturing of large aerostructures, we can benefit from the abilities and expertise of others. We previously outsourced much of our finishing

processes, which was a costly endeavor. The investment required for large-scale chemical lines is significant, so we have partnered with Sonaca Montreal. This partnership is highly streamlined and both companies benefit from being able to offer customers more integrated services. Partnerships are important as they broaden our range of product offerings. This is significant because tier-ones and OEMs are constantly questioning the supply chains of their partners; through partnership, we attract more business.

## **As a case study, what has been one of Mecachrome's recent projects?**

Mecachrome recently completed a highly expedited project for GE Aviation, in which we manufactured an experimental pylon (flying test bed) for its Leap-1A flying test bed. This type of project is usually handled in the United States, but due to the client's request, we were asked to manage its production. The project was highly complex, comprised of 1,500 steel components, and required very quick turnaround. The typical production time for this type of project is 10 to 12 months, but we had to accelerate and managed to complete the production in six months. To do this, we relied heavily on the strengths of our supply chain and involved many companies within Quebec's aerospace cluster.

## **Mecachrome is a sponsor in Aero Montreal's MACH program. Tell us about this initiative and the role that sponsors play in making Quebec's aerospace cluster more competitive.**

The purpose of MACH is to create a comprehensive, supply-chain program similar to those used by Boeing and Bombardier – which many suppliers are not involved in – and to enhance the quality and competitiveness of Quebec's aerospace industry. It also has the effect of creating a benchmarking system in which suppliers can see their progress as they implement improvements. Mecachrome was approached by Bombardier to act as a sponsor to smaller suppliers in the cluster. Under this initiative, we share the knowledge base of our supply-chain experts and lean manufacturing practices with smaller suppliers.

## **What are some of Mecachrome's goals for the future?**

Mecachrome will continue its quest for vertical integration, while taking on more design-to-build projects. We recognize that tier-1s desire more consolidation within the industry so we will continue to develop our relationship with major clients while furthering existing partnerships. Our goal is to grow our business with tier-1s and to ultimately increase our direct work with OEMs. The industry message is now to ensure higher performance in terms of quality and delivery while reducing cost through continuous improvement and innovations. •

# Sylvain Bédard

CEO, Sonaca Montreal



*"Sonaca Montreal's key focus has been to provide the global aerospace market with wing skins."*

## **Please provide us with an overview of Sonaca Montreal's operations, and the evolution of its presence in Quebec.**

Founded in 1991, the company began as a small business providing shot peening services; it then evolved into the machining, surface treatment, painting and assembly of parts. In 2003, the company was acquired by Sonaca Group based out of Belgium. Since then sales have tripled. Sonaca Montreal is now a medium-sized enterprise within the larger Sonaca Group, whose global network offers key synergies to Sonaca Montreal.

Sonaca Montreal has unique facilities in Canada; it is the only place in the country capable of manufacturing long and complex aerostructure parts, which can be up to 60 feet in length. Sonaca Montreal is a fully integrated, one-stop shop that encompasses the manufacturing and assembly of aerospace structures.

## **Can you guide us through how Sonaca Montreal became a fully-integrated company in Quebec?**

Customer needs are an important ingredient of full-integration. Accommodating customer needs and finding efficient and economical ways to source parts are all important factors that play a role in becoming a fully-integrated company. Sonaca Montreal's management team has first-hand experience in these areas, specifically in the manufacturing of wings structures, and consequently has the ability to bring extensive value to its customers.

## **What is the key focus of your operations?**

Sonaca Montreal's key focus has been to provide the global aerospace market with wing skins. To date, Sonaca Montreal enjoys around 50 percent of the world's market share for business and regional aircraft wing skins. Looking forward, Sonaca Montreal will concentrate its efforts on pursuing larger aircraft, such as those of Boeing, while also monitoring the implementation of Airbus' activity in North America.

Additionally, Sonaca Montreal would like to continue to leverage its capabilities of machining long parts, by expanding its offerings to include other long parts related to wing aerostructures such as ribs, stringers, and spars. To do this, Sonaca Montreal has invested, and will continue to invest, in specialized equipment that will enable the expansion of our product offerings.

## **How many wing skins does Sonaca Montreal produce annually and what different aircraft platforms do they service?**

Each year we transform approximately 4 million pounds of aluminum through our manufacturing activities, producing around 4,000 wing skins annually. Sonaca Montreal services the following platforms: all of Bombardier's aircraft except for the C-series,

as it utilizes composite for the wing; Embraer; and Gulfstream selling direct or to Tier-1s such as Triumph, MHI and Spirit.

## **Can you give details related to your work in research and development (R&D)?**

Sonaca Montreal's focus on R&D is primarily dedicated to enhancing manufacturing processes; but our team also monitors the needs of OEMs as they seek to reduce the weight of their aircraft through composites and different aluminum alloys. While Sonaca Montreal does not work in composites, we work with mills to identify and develop new aluminum alloys that can provide solutions that meet the needs of our customers.

## **Sonaca Montreal recently expanded its facilities. How did this effect this growth and what advantage do your one-stop-shop facilities hold in the marketplace?**

In 2012, we increased the capacity of Sonaca Montreal's facilities by 30 percent. We are currently running a 24/7 operation and look to further augment our abilities capacity internally with faster equipment; automation plays a big role in our facility. Being fully integrated, our operations benefit from not having to work with an extensive list of suppliers; this quality allows Sonaca Montreal to price its products competitively in the market. Additionally, we require shorter lead-time than our competitors for producing parts: our typical cycle time is 30 days to process a ship-set; two to three weeks shorter than competitors who need to outsource certain steps in the production process.

## **Are you targeting any particular regional markets?**

We have developed a strategy for 2015 to strengthen our presence in the United States by increasing our sales presence; the objective will be to sell both Sonaca Montreal and Sonaca Group's work. We will also be looking to make acquisitions in the United States, which will complement the Sonaca Group's capabilities in terms of equipment and customer base.

## **Over the next three to five years, what are some of Sonaca Montreal's overarching goals?**

Sonaca Montreal's forward strategy is as follows: double sales by investing in new equipment and in-house automation; diversify our product portfolio whilst maintaining our core competency of large and complex aerostructure parts; and make acquisitions that will complement the group's product offerings. Overall, Sonaca Montreal is a great organization: it understands the needs of its customers, has a unique integrated facility for large and complex aerostructure parts, is price-competitive, and has vast experience of the North American market. •

# Alain Ouellette

Director Robotization,  
General Electric Bromont



*"R&D is essential to GE's strategy of maintaining a competitive edge. Once we have identified a vision, we must develop automation processes related to its technology."*

## **What is the specialization of General Electric's Bromont facility within its global network?**

The General Electric (GE) Aviation business unit contains over 90 sites. In Bromont, we have a 250,000-square foot facility that manufactures forged and milled aviation parts, such as compressor blades and vanes, while we have also diversified our operations to include component assembly capabilities. We work primarily with titanium, stainless steel, and Inconel alloys and in 2015 we have a forecasted production of 3.5 million parts.

In addition to our flagship facility in Bromont, in 2011 we were asked to establish three new business units: GE Aviation Global Automation R&D Center, which officially opened in July 2013; Instrumentation and Vibration Team; and Test System Enabling Design Team. These are the core branches that constitute our activity at the Bromont Facility.

## **Within GE Aviation's network of over 90 sites, its Bromont facility is one of the most productive. To what do you attribute this productivity?**

In the late 1990s, the Bromont facility adopted a lean manufacturing approach. At the same time we also took strong measures to incorporate automation; today, we have over 120 robots integrated into our manufacturing operations. This proved highly effective in enhancing the quality and productivity of our operations. Consequently, we have enjoyed sustained productivity increases in excess of 7% annually. In comparison, many of GE's other sites have only three or fewer robots. Going forward, we would like to scale the application of automation within our other sites. To do this, it will be important to create generic solutions that we can adapt to the needs of each site.

## **Despite the benefits of automation, robots are often perceived as replacements for manpower. Where did you first start applying robots in your operations and how was this received within the company?**

The initial application of GE Bromont's robots was directed at harsh operating environments, such as forging, in which you need to move parts from an oven-forging to a trim-press. This process poses an incredibly hot environment (ovens over 1,800 degrees Fahrenheit); consequently, our employees were enthusiastic about the move towards automation of this process, which has eliminated over 45 million at-risk, non-ergonomic movements each year and has resolved several health and safety issues related to certain aspects of the manufacturing process. In the late 1990s, we implemented an automation project directed at a forming press. Many employees were initially skeptical that a robot could perform the task at the same quality level as

a human; however, within five years none of our employees could imagine working without the automated forging press.

## **What is the contribution of local small and medium-sized enterprises (SMEs) in developing technologies for the aviation industry?**

GE will never internally acquire all of the knowledge and capacities comprised within its supply chain. The partnerships and networks we have established have allowed us to make contact with some of the most advanced minds in robotics. Since opening the GE Aviation Global Automation R&D Center, its staff has grown to over 40 employees. However, there is no single organization large enough to support the entire GE group. Consequently, we source expertise and knowledge from universities, SMEs, and local partnerships.

## **How important is R&D at GE's Bromont facility?**

R&D is essential to GE's strategy of maintaining a competitive edge. Once we have identified a vision, we must develop automation processes related to its technology. The commercialization process is often time consuming, so it is critical that we continue to invest early on in the development of new technologies.

## **The Government of Quebec recently invested C\$8 million in GE's Bromont facility for R&D. How do incentives such as these contribute to Quebec's business environment for aerospace activity?**

The aerospace industry is highly competitive globally. Incentives such as those from the Quebec government have allowed us to develop new teams and have provided us an advantageous environment for fruitful R&D efforts. Investissement Quebec and other organizations within the province are also very supportive in welcoming companies like GE to invest in the province.

## **How does its Bromont facility incorporate environmental sustainability into its operations?**

GE's Bromont facility has long had a proactive track record related to energy conservation. All of the materials and machinery that we work with are assessed for environmental impact. As part of this focus we are very active in Recycle Quebec; last year the facility achieved a level of 94 percent.

## **Do you have a final message?**

GE has had a presence in Quebec since 1982. The local workforce, skills, and government have all contributed to the success of our Bromont facility. Quebec is an integral part of GE's network, and we are optimistic regarding the years to come. •



Mecaer helicopter landing gear under test prior to delivery. Photo courtesy of Mecaer America.

## Chris O'Neill

President and Chief Operating Officer,  
Mecaer America



### **Founded in 2002, Mecaer America is part of the Italian conglomerate Mecaer Aviation Group. Please walk us through the evolution of Mecaer America and its presence in Quebec.**

Mecaer Aviation Group (MAG) began its operations in Quebec in 2002 through the acquisition of Performance LT, which was a manufacturing job-shop. This gave rise to Mecaer America (Mecaer), which has since transformed itself and developed into a fully integrated landing gear company. Everyone within the industry talks about design-integration, yet there are very few companies in Quebec that have successfully moved from manufacturing into design. One of the exceptions is Mecaer; generally speaking, companies that try to do so often go bankrupt. Fortunately, Mecaer benefited from the long-term approach of MAG and was able to be successful in the transition. Consequently, over the years Mecaer has grown its panoply of programs to include entire landing gear systems: structures, control panels, brakes, electro-mechanical actuation, and so on, both for helicopters and airplanes. Mecaer's facilities are capable of handling almost any helicopter landing gear, while also being able to do most airplanes up to regional jet size, size being the only limitation. Nearly all of Mecaer's helicopter landing gears are proprietary, while the vast majority of its airplane landing gears are build-to-print. Mecaer benefits from its position within MAG as its companies share many commonalities, synergies which we actively try to capture.

### **What have been some of Mecaer's recent achievements?**

2014 was a big year for Mecaer. In addition to moving our operations into a new facility, we also designed and industrialized three new programs, one of which being one of the most significant build-to-print programs to come to market in the last 10 years, the Gulfstream G500 for UTAS.

### **For what Mecaer is able to accomplish, it is a relatively small company. How does your size help you in the market?**

Mecaer's workforce is comprised of 118 individuals. Due to our size, we are highly dynamic. This in turn affords us supreme flexibility in what we are able to accomplish. For instance, while larger companies are unable to fathom short-term design changes, we are able to pull off five design changes in one week. Mecaer is unique in the respect that it is a small company that has worked its way into a sector dominated by massive players. This represents a breath of fresh air for OEMS – who have traditionally been held hostage by



the larger companies – as Mecaer offers sophisticated design infrastructure while maintaining the humble approach of a job-shop.

**What role does research and development play in Mecaer's continued integration?**

On a design level, Mecaer has yet to develop all of its own technology; some technology is purchased and integrated into our landing gears. However, from a structural perspective, which is 80 percent of the gear, Mecaer develops all of its own technology. Looking forward, we certainly want to grow our capacity to add value to our landing gears by further developing our proprietary technologies. Mecaer invests a substantial amount of money each year, on average \$5 million, on research and development initiatives. The biggest game changer in actuation right now is electro-mechanical, so this will be an area in which we will focus.

**Over the last three years, Mecaer America has posted growth figures of 22 percent. How does Mecaer contribute to the growth of its parent company?**

Over the last five years, Mecaer has nearly tripled in sales. Through organic growth alone, we expect to achieve between 50 and 75 percent growth in the coming years. The industry in general probably has between 10 and 15 really excellent years ahead, barring a

major economic catastrophe. Having been in the aerospace business for over 30 years, I have seen four or five defined business cycles: we are on our way to the next cycle. We can expect to see the rise of many acquisitions and synergies, as the industry continues to torque itself up over the coming years. Furthermore, the foreign exchange rate is presently an important advantage for Canadian companies and will remain this way for the foreseeable future.

**What do you attribute to Mecaer's strong growth rates? What is your strategy for future growth?**

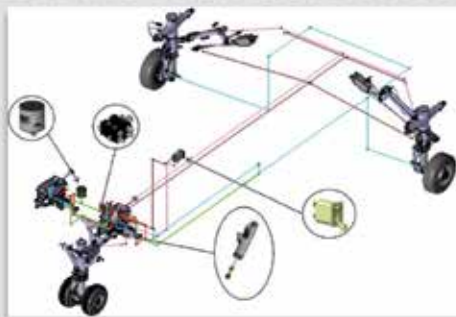
Mecaer benefits from a well-established allocation of booked sales. In the coming years we want to balance out the build-to-print side of our business with our own proprietary programs. We will spend a lot of energy diversifying our portfolio so that our business mix is both recession-proof and customer-proof. As far as markets go, right now we are heavily concentrated in the business jet segment. We will try to diversify away from this and perhaps add some military work as well. With that said, overall we have an enviable sales mix and continued growth is promising. We are continuing to invest and develop new programs that will keep us competitive in the market. This is important because the aerospace industry has a very bright future ahead and it would be a shame to be shackled to legacy programs with no new initiatives in the pipeline. •



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# Gilles Labbé

President and CEO, Héroux-Devtek Inc.



*"We are looking at expanding our offering in the landing gear systems and are considering the acquisition of complementary manufacturers to better serve our clients."*

## Héroux-Devtek has been around for over 73 years. What are some of the major milestones in the company's history?

Our first major milestone was manufacturing the landing gear for the Apollo Lunar Module, essentially making us one of the first aircraft component manufacturers on the moon. Back in 1969, we were the first on the moon; later, in the 1970s, we won a major contract with the United States Air Force to repair and overhaul landing gears for the KC-135 and C-130. We have maintained this workload since. This means that every C1-30 that flies in the United States Air Force is repaired and maintained by Héroux-Devtek. In 2000, we purchased our major competitor: Devtek Corporation. Subsequently, in 2001 we built an aerostructure facility in Dorval. In 2004 we acquired Progressive Inc., the largest manufacturer of bulkhead for F16 and F35. In 2010, we acquired Eagle Tool & Machine Co. and E2 Precision.

In 2011 and 2012, the company was making sales of over \$380 million, but the stock price was undervalued. So, in 2012 we sold off the aero structure and industrial product operations to Precision Castparts Corp. In doing this we created a large increase in value for our shareholders.

In 2013, we landed the biggest contract in Héroux-Devtek history, becoming the sole manufacturer of the Boeing 777 landing gear.

## You have a successful track record of maintaining long-standing relationships with customers, for example Bell Helicopters and Boeing. What has differentiated you from your competition?

It comes down to the performance and quality of your product and additionally to your customer service and delivery. We put a strong emphasis on maintaining strong relationships with our customers.

## How does research and development (R&D) play a role within Héroux-Devtek?

R&D is a pillar of Héroux-Devtek. We spend from 5% to 6% of our revenue on R&D. In 2010 we built an R&D center in Quebec. The aerospace industry is technology based, and it is to our advantage to maintain a leading position in technology development within the aerospace industry. We believe that we are creating the future for our people.

## Within the cluster of aerospace companies in Quebec where does Héroux-Devtek fit?

Montreal is the third largest aerospace center in the world. Montreal is one of the only places in the world where you can build an entire airplane within a 30 kilometer (km) radius. For example, the CL-415 by Bombardier is predominantly built in Montreal,

with a few parts from Ontario.

Montreal is a center for aerospace excellence. There are four top universities that are training top engineers and two technical schools that are meeting the need for highly trained and skilled tradesmen. The government is also very supportive of the industry, through the provision of incentives for the aerospace industry.

## Where do you see Héroux-Devtek in the next five years?

We are looking at expanding our offering in the landing gear systems and are considering the acquisition of complementary manufacturers to better serve our clients. We are looking for companies with a lot of intellectual property (IP), strong customer relationships and positive relationships with the governing bodies.

In business, there are three things that matter: the customer, your employee and your shareholders. Maintaining a balance of all three is key to the success of any business. Our culture foundation is based on four main values: respect, responsibility, recognition and resilience. •



*Héroux-Devtek aims to grow as an industry leader by exceeding customer expectations through the dedication and commitment of its people. Photo courtesy of Héroux-Devtek.*

# Guillermo Alonso

President, Alta Precision



*"Alta Precision's major projects include a recent contract to produce the major components for the landing gear of Embraer's E2 program, the second-generation of this jet series."*

## **To begin, please provide us with an overview of your professional background and describe your role as president of Alta Precision.**

I have an engineering background but withdrew from Concordia University to join the family business of Alta Precision, founded by my father and a business partner in 1979. The company was a three-man generalist machine shop within the aerospace industry and took advantage of a government-backed initiative to finance the aerospace industry in Quebec. In 1990, we acquired land to build our own premises; in 2000, we expanded the building to its current size. While remaining generalists, we became increasingly focused on landing gears; 2001 brought the decision to strictly specialize in landing gears.

In 2015, we continue to grow with an annual revenue of C\$20 million to C\$30 million, supported by a staff of 110 employees. We do not work directly with OEMs, except for Embraer in Brazil, who has their own landing gear design and manufacturing capabilities. Alternatively, we deal with tier-1s such as Goodrich, Messier-Bugatti-Dowty, and Héroux-Devtek.

## **What is Alta Precision's specialization for landing gears?**

Within the landing gear market we focus more on the medium-to-large major structural components, for example large cylinders, pistons, axles. We also carry out assembly work and special processing. Landing gear is a big user of special processing, a part of the aircraft enduring hardship – extreme temperatures, moisture, rust and wear, and needs to be protected by chemical processing. Alta Precision supplies sub-systems; testing of the assembled landing gear is carried out by tier-1s. We manufacture anywhere from 200 to 300 components and are recognized for our expertise in structural components.

## **How does Alta Precision's product offering differ from its competitors; and can you elaborate on your facilities, which provides you unique positioning in the market?**

We have the equipment to process heavy parts, which sets us apart from our competitors. Alta Precision is a stakeholder in the special processing shop of Tekalia in Montreal, giving us instant access to this facility. We are sole-owners of our premises, which includes a paint and assembly shop. This vertical integration is the result of learning from our customers' feedback and experience.

## **What are some of the current projects that Alta Precision is working on?**

Alta Precision's major projects include a recent contract to produce the major components for the landing gear of Embraer's E2

program, the second-generation of this jet series. This project will necessitate the doubling in size of our premises; equipment has been purchased and we are considering whether to expand our facility or move to a new location. Our growth will be in Montreal. Another option was the United States, but our military business there has declined due to cuts in military budgets, and the application by the Democrats of previously unenforced laws, which favor the tenders of smaller, American-based companies. Our current breakdown of business is 75% commercial and 25% military. In the past, it was 50-50. Looking forward, we have not closed the door of expanding into the United States.

## **What is the proportion of your business between export and the domestic markets; will expanding your customer-base be a focus for your growth; and what is the biggest differentiating factor that Alta Precision brings to the market?**

Our only Quebec-based customer is Héroux-Devtek, which accounts for 5% and 10% of our sales. The remainder of our business is from Europe and Brazil. Asia is not an easy market for Alta Precision to penetrate; this market is more akin to repair and overhaul. Our tier-1 and integrator contacts are based in Europe, US and Brazil. The corporate jet market is recovering from the downturn of 2008; it is a market that we would like to develop. We will also grow our portfolio with existing customers. Our value-proposition is that we are a small vertically integrated business with agility.

## **What steps does Alta Precision take to ensure that its corporate mission of quality is maintained?**

The perpetuation of quality control is paramount to Alta Precision. We have on-going in-house training, certified operator programs at manufacturing level, quality managers, and strict quality systems. Every new employee has first-rate training from our quality manager, emphasizing the principle that only the finest work is acceptable. Briefing is given on the dire consequences if this standard is not maintained, e.g. a broken axle on landing with possible loss of life. Our customers never receive a part that does not conform to our high standards. The aerospace industry is realizing that North America is a high-tech low-cost source, and with its expertise is propelling it to the forefront of the market.

## **In the next three to five years, where would you like to see Alta Precision?**

In the next five years, Alta Precision will double in size. This will be achieved through growing its market-share with existing customers, delivering quality on time and maintaining customer satisfaction. We believe in partnerships and are always open to joint-ventures on contracts. •

# Christian Delisle

President, Electro-kut Inc.



*"Electro-kut specializes in the machining of landing gear components; nearly half of our work is with exotic materials, while the remaining focus is on aluminum parts."*

**Since its inception, Electro-kut has utilized electrical discharge machining as one of its core business offerings. Tell us about this offering and the evolution of Electro-kut’s machining processes.**

Electrical discharge machining (EDM) is a very specialized form of machining, typically used for tooling processes. While tooling usually requires several components for assembly, wire EDM processes permit tooling assembly to be facilitated by its characteristics. EDM also yields higher rates of precision than conventional machining methods, capable of achieving measurements down to two or three microns. Electro-kut manages both types of EDM: traveling wire and die-sink systems, which have allowed us to establish a presence in areas that range from extrusion dies, die stamping, molding, aerospace and aeronautic components. Building off of 10 years of experience in this area, we decided to transform into a comprehensive machine shop through the acquisition of basic CNC machines that are able to handle proper tooling, which feeds into our EDM capabilities. This has emerged

as the most lucrative aspect of our business.

**Over the last 10 years, Electro-kut has realigned its focus towards the aerospace industry. What was the strategic rationale for this decision?**

Since its inception, Electro-kut has been recognized for its technical skills and commitment to quality. However, around 2005, we began to lose customers to low-cost manufacturing in emerging countries. We attempted to compete, but this proved difficult to sustain. Consequently, we decided to leverage our expertise and apply it to the field of aerospace. We had experience in very high precision machining and tooling, which positioned us well. It took us several years to acquire the necessary aerospace accreditations, including the specific NADCAP for EDM processes, and to integrate this within our capabilities, but the process has proved successful.

**What are your machining competencies and what are the different types of products that you work with?**

Electro-kut specializes in the machining of landing gear components; nearly half of our work is with exotic materials, while the remaining focus is on aluminum parts. As we continue to grow, our specialization will be centered on forging and casting components. These components are framed to size, but require geometric analysis to ensure precision from the datum. Part of this process necessitates tooling design, which holds the component to the machine to ensure precision throughout the process. Oftentimes, this requires separate setups; therefore, the challenge is in maintaining precision between unique setups. Our machines permit automation, which is a theme of increasing importance for our operations. As a company, our plan is to optimize versatile machines capable of managing the production of complex components at low volumes. Our mission is "Simplified Complexity." The emphasis is on improving our manufacturing processes to reduce production time and acquire a larger market share while minimizing capital expenditures on equipment and facilities.

**Can you tell us about Electro-kut’s move into the market of light sub-assemblies?**

In 2009, Electro-kut saw a shift in the market as our customers were looking for suppliers capable of handling light sub-assemblies, and we have recently developed strong competencies in this area. Furthermore, the industry requires extensive specification for all of its components. While smaller companies like us are accustomed to more artisanal work, greater emphasis is now placed on specification, and we intend to continue developing our processes accordingly.

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**SIMPLIFIED COMPLEXITY**

# Michel Bussey

Vice President and General Manager,  
Zodiac Aerospace



*"Zodiac Aerospace offers full integration of business jet cabin interiors. We manage the engineering, fabrication, and certification of our products and deliver them to our customers with a "plug-and-play" concept."*

## **Zodiac Aerospace has maintained a presence in the aerospace industry since 1896. To begin, please provide us with an overview of the group's overall operations.**

Zodiac Aerospace is comprised of six principal segments: Zodiac Galleys & Equipment, focused on commercial galleys for single-aisle and double-aisle aircraft; Zodiac Seats, which manufactures seats and seat shells for a variety of aircraft; Zodiac Aerosafety, which develops products such as life rafts and parachutes; Zodiac Aircraft Systems, which is the group's most diversified business segment, as it handles electric systems, fuel systems, data systems, hydraulics, and many other aspects of an aircraft; Zodiac Aerospace Services, which provides support to customers across all of our business segments; and Zodiac Cabin & Structures, which is divided into four segments: OEM interiors for commercial aircraft, airline interiors for retrofitting, structural engineered materials, and business aircraft cabin interiors, which is the focus of our operations in Montreal.

## **Zodiac Aerospace's operations in Montreal are focused on the development of business aircraft cabin interiors. Can you walk us through the range of products and services that you provide to this market?**

In Montreal, Zodiac Aerospace offers full integration of business jet cabin interiors. We manage the engineering, fabrication, and certification of our products and deliver them to our customers with a "plug-and-play" concept. While we offer turnkey solutions, we also provide mix-and-match services and are able to do anything in between. In addition to our facilities in Montreal, we also benefit from an extension of our division in Tijuana, Mexico, which does the layup of parts specifically for us.

## **What is the composition of Zodiac Aerospace's business units in Montreal, and how do these units allow the company to function as an integrated supplier of cabin interiors for business aircraft?**

Zodiac Aerospace in Montreal has a staff of 950 dedicated employees, of which 125 are engineers in Montreal who are focused on developing and managing product specifications. This team of engineers works with our customers, such as Bombardier, while not directly interacting with the end-user of the aircraft. If the customer desires a specific cabin interior option, we guide them and look at the possibility of using one of our preexisting solutions. We try to limit their choices to preserve continuity within our production operations. We then hand this process off to our design engineers, who complete the drawing package. This is sent out to the planning department, which oversees the purchasing and planning for our floor operations. When

production starts, we have segmented our operations into four divisions: cutting with CNCs and pre-finishing of wood, sub-assembly, finishing, and then final assembly. We certify everything throughout the process and ultimately deliver the final package to our customers.

## **What is the competitive landscape for business aircraft cabin interiors in Quebec and what is Zodiac Aerospace doing to differentiate itself within the market?**

The competitive landscape for cabin interiors differs between commercial and business aircraft. Bombardier, for instance, has its own cabinetry manufacturing so on this front my main competitor is also my main customer. Other than that, there is limited competition for business jet cabin interiors in Quebec. We differentiate ourselves in the way that we assemble parts. We have a pressurized system on the floor, which is a lean process that drives significant savings in cost of labor.

We are also taking steps to increase the role of automation within our operations. We have developed a robot with AV&R in St-Bruno and Excel Finishing Product for an automatic sprayer finishing, a process that does not otherwise exist in our industry. It is a big investment but will be a factor that will further differentiate us both operationally and environmentally

## **What is your sense of the quality of human capital being produced in Quebec specifically for the aerospace industry?**

Quebec benefits from an excellent pool of engineering talent. In Montreal, we have one of Zodiac Aerospace's largest engineering divisions in terms of bodies on-site. Our operations are very engineering-oriented because each business aircraft's cabin interior requires high levels of customization. We partner with several Quebec universities, such as McGill for finishing and Sherbrooke for acoustics, and provide internships for students of many local institutions of higher education during the summer.

The province is more limited in terms of manufacturing expertise. For this reason, we have opted to manage our own training internally. Because Bombardier is a large magnet for aerospace manufacturing, we look for different ways of bringing in manufacturing expertise and often attract workers with little previous aerospace knowledge. We teach them from the ground up. The way our floor is laid out, it is easier for them to enter at the beginning of the line and learn as they move along. This also helps in the case that employees are taken by other aerospace manufacturers, as we are able to just move everyone up the line. In the future and based on growth, we will use this low cost country advantage to improve our offerings to our customer base. •



The Montreal facility dedicated to world class Business Aircraft Interior. Photo courtesy of Zodiac Aerospace.

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**ZODIAC  
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AIRCRAFT CABIN INTERIORS

## Éric Faucher

President and General Manager,  
Hutchinson Aerospace & Industry Ltd.



*"Hutchinson's objective is to offer an integrated interior system that takes on the full design for air distribution, fluid transfer, and interiors for an aircraft."*

### **Hutchinson is a European enterprise with an extensive industrial and regional presence. To begin, tell us about the evolution of Hutchinson's involvement in the aerospace sector.**

Hutchinson has always been present in the aerospace sector, but it was in late 1990 that it really commenced its program of acquisitions and developed a strong group around body sealing, anti-vibration, transmission and fluid transfer. Furthermore, over the last five years, Hutchinson has made several acquisitions within the composite sector: KTN in Germany; Strativer in France; and Marquez Transtech in Canada. A current focal point of the group's strategy is to transpose its European expertise in the composite sector to the North American market.

### **Hutchinson's acquisition of Marquez Transtech in 2013 afforded it footing in the North American market. What was the strategic importance of this acquisition for Hutchinson's global operations?**

Marquez Transtech was an SME with aspirations to become a tier-1 supplier. This goal was achieved by joining forces with Hutchinson, as it provided an entry-point into the European market. Conversely, Marquez Transtech's technology, such as its composite products present in Boeing's 787, interested Hutchinson and allowed it to develop more comprehensive solutions for cabin interiors, while at the same time providing a stepping-stone into the North American market.

The acquisition also opened up our ability to share technology from other businesses within the group and integrate more functionality into our product. It also provides us with access to customers that were previously out of our sphere and can offer other OEMs our portfolio of composite products for cabin interiors. Looking forward, the group will sustain its strategy by supporting investment in research and development (R&D).

### **What is the range of cabin interior products that Hutchinson provides to the aerospace industry?**

The vast majority of Hutchinson's products in Canada are design-to-build, with build-to-print representing a small portion of our business that is designated for the automotive industry. Our range of aerospace cabin interior products includes full cockpits integration of trim panels and structure, such as glare shields; low pressure ECS ducting; kitting of curved panels for cabin monument; and ring retainers for the prevention of window fogging.

Our proprietary ducting system technology, a composites-thermoplastic product for low-pressure air distribution in Boeing's 787, offers a 50 percent weight reduction when compared to other products on the market. We also differentiate ourselves with a car-

bon fiber finish on the cockpit of Bombardier's Global 5000/6000 series. Our products are primarily focused on business aircraft, except air distribution ducting, which is used in both commercial and business aircraft.

### **Please describe some of Hutchinson's other ongoing projects?**

Hutchinson is currently working on the interior panels for Bombardier's Global 7000/8000 series monument and was selected to design and manufacture the new Vision Flight Deck on the Bombardier's Challenger 650. We also work closely with CAE, supplying the thermoplastic for its flight simulators and the Volvo Group for the truck industry.

### **What is the competitive landscape for aerospace composites and thermoplastics globally?**

Many of Hutchinson's products are proprietary, such as our composite-thermoplastic ducting, which presents product differentiation for our customers and affords us strong positioning within our niche. With that said, the market for aerospace cabin interiors is highly competitive. Hutchinson benefits from being fully integrated and being able to manufacture entire systems that are competitively priced. Being located in Quebec, we work in close proximity to the assembly facilities of Bombardier, Pratt & Whitney, and Aerolia, which allows us to assist in development and design work, something that is particularly useful for interior finishing.

### **What are some of Hutchinson's latest R&D initiatives and what new innovations do you have in the pipeline?**

Hutchinson has a large R&D group, which partners with learning institutions in the development of new technologies that address the needs of our customers. The government also plays an active role in many of these R&D initiatives. The focus is on liquid molding, which will further differentiate us from other companies. Liquid molding occurs through the resin transfer molding (RTM) infusion process, and our current efforts are directed towards the automation of this process, which will allow us to achieve a more robust method for secondary structures. Furthermore, this will offer a cost-effective alternative to autoclave molding; for instance, on a primary structure, costs can be reduced by as much as 50 percent.

### **Do you have a final message?**

Hutchinson's objective is to offer an integrated interior system that takes on the full design for air distribution, fluid transfer, and interiors for an aircraft. Our differentiating quality is that we offer out-of-the-box solutions to satisfy the needs of our customers. •

# Peter Graham & Dominique Quintal

PG: Co-President

DQ: Director of Business Development,

GGI International



**To begin, please tell us about the evolution of GGI International and its involvement in aerospace.**

PG: GGI International's roots date back to the early 1900s in the product identification business, where our grandfather introduced one of the first pressure-sensitive products into Canada. After several years our father joined the business and today GGI is proudly owned and operated by my brother and me. GGI International has evolved significantly over its history: migrating from a product identification business to a well-recognized global leader in the design, engineering and manufacturing of custom human machine interface (HMI) technologies.

The aerospace industry is one of GGI's strategic market sectors with healthy growth projected over the next five to 10 years. GGI International's other market sectors are: defense, medical and higher end-industrial controls. GGI International first started to supply product to the aerospace sector in the early 2000s; however, only in the past five to six years have we seriously focused our efforts on this demanding industry. We obtained AS9100C certification in 2012, which is an important milestone necessary in order to supply product to Global leading OEM's in this industry. Today, if we were to group our activity in the aerospace and defense industries, as they are similar in terms of requirements and expectations, it would represent approximately 30 percent of our business revenue.

**What is HMI technology and how does it apply to an aircraft?**

DQ: An aircraft's cabin interior is composed of many parts: seats,

galley inserts, lights, and in-flight entertainment systems, to name but a few. Each of these items interacts with a user (cabin crew, passengers, maintenance crew, etc.); this is the role of HMI technology. GGI International brings innovative HMI technology to aircraft cabins; examples of our products include: cabin signage, seat control panels, call systems for flight attendants, and reading light switches. All of these products are expected to be intuitive and esthetically appealing, and to function seamlessly. These assemblies must also meet stringent functional and environmental requirements imposed by the global leading commercial aircraft manufacturers: passengers will interact with our various HMI assemblies for anywhere from one hour to 12 hours at a time depending on the length of a specific flight. We are not necessarily dealing with repeat users, which means that having an intuitive platform is important in order to adapt to a wide range of potential users.

**Looking forward, what is GGI International's growth strategy?**

DQ: GGI International has always focused on expanding its range of technologies with the goal of "staying ahead of the curve." We are not a single technology company, single solution company, nor a single product company. We specialize in superior product customization with a focus on reliability. We believe firmly in investing in R&D and have an excellent team of professionals in the GGI family, which is our foundation for current and future growth. We see blue skies in the future and are ready for takeoff. •



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# Michel Grenier

Vice President and General Manager,  
Avionics, **Thales Canada**



*"Fly-by-wire technology is especially prevalent in the high-end business and air transport markets, and in our mind will be standard on all new aircrafts"*

## **What is the focus of Thales Canada's operations in Montreal?**

Thales has had a presence in Canada for 30 years and has been active in aerospace since the late 1990s, at which point we started to work with Bombardier on its Global Express program. In Montreal, we primarily work within the niche of flight controls and fly-by-wire technologies for the business jet and regional jet markets. While this is our specialization in Canada, we are also able to leverage our portfolio of avionics products in France to complement what we are doing for our customers here.

## **How does fly-by-wire technology work and how prevalent is it today?**

Fly-by-wire is a computer system that controls the surfaces on the wings and tail of an aircraft. It allows planes to turn, go up and down, and land safely. The pilot input is sent to the computer, where it is analyzed to make sure that it is within the flight envelope of the aircraft. If the input is validated, a command is sent to the actuators on the wings to move its surfaces, which allows the plane to turn.

Fly-by-wire technology is especially prevalent in the high-end business and air transport markets, and in our mind will be standard on all new aircrafts. Within the lower-end market, aircrafts valued below \$20 million, there is a trade-off between whether it makes sense to invest in this type of technology or to remain with more conventional technology. Our customers have said that it is becoming easier to certify aircrafts with fly-by-wire technology than conventional technologies, because fly-by-wire is easier to demonstrate how an aircraft will behave while also capturing any potential faults. We also see that helicopters are gradually moving to fly-by-wire technology. Although we do not currently have fly-by-wire for the helicopter market, it is something we are looking at for the future. Fly-by-wire is also applicable to larger commercial aircraft, but here in Canada, our mandate is to work on the business jet and the regional jet markets.

## **How would you describe the competitive landscape for fly-by-wire technology?**

The bar is set high for fly-by-wire technology and its market is very competitive. If you want to develop a flight control computer, it is an intricate process. This is very critical equipment and you cannot tolerate a fault in the computer because if you lose it, you lose the aircraft. The engineering is very demanding because it entails systems engineering, redundancy, and all of the analysis that must be done to make sure that the equipment is safe and reliable.

## **What are the defining characteristics of Thales' fly-by-wire technology?**

The feedback that we get from our customers is that we are able to tightly and neatly integrate our fly-by-wire technology into two computers, whereas some aircraft models have five or six computers dedicated to these functions, primarily for redundancy and dissimilarity. With fly-by-wire technology you want to build the computers differently because you do not want them to have the same faults and fail at the same time. We have been able to integrate our technology into smaller boxes that do not take up too much space on an aircraft, allowing OEMs to save more cabin space for their passengers.

## **What trends has Thales identified in the needs of its customers?**

Aerospace companies are always looking to reduce the weight of aircrafts for fuel purposes. However, in the business jet market, especially for high-end aircrafts, the concern is more focused on lifecycle costs. One common message that we hear is the desire for more cabin space. Accordingly, the more we can integrate and refine the spatial requirements of our products, the more our customers can expand their cabins.

## **Looking forward, what is Thales Canada's strategic growth plan?**

Thales Canada is very lucky to be working in the business jet market, which has recently benefited from strong trends in growth. Going forward, we want to increase our footprint in this market, not only with flight controls, but with other products as well. We also have a solid presence in the regional jet market, but we need to maintain and consolidate our presence in this area. While the regional jet market is more stable, we see our strongest growth potential on the business jet side.

## **In three to five years, what position does Thales Canada want to achieve in Canada?**

Thales Canada wants to grow its presence by continuing to work with Bombardier on its next platform, helping it with its technology development program. We want to broaden our customer base and to work with other OEMs in the business jet and regional jet markets. Overall, we feel like the Canadian marketplace is a great place to work and are proud to have had an established presence here since 1997. We are well supported by Quebec's aerospace cluster and the Government of Quebec. Quebec provides a good business environment for aerospace, and we think that we have the right skills in Montreal to grow our business. •

# Hugue Meloche

President and CEO, Meloche Group



*"Meloche Group is currently positioned as a vertically integrated tier-3 supplier that has engineering, machining, special processes, and assembly capabilities."*

**Despite Meloche Group's 40-year history, its presence in the aerospace industry is relatively new. To begin, please walk us through the evolution of Meloche Group and its entry into the aerospace market.**

Founded in 1974, Meloche Group is a family-owned business that has evolved as a machining specialist within the local textile, automotive, telecommunications, and aerospace industries. I joined Meloche Group in 2004, at which point the telecommunications industry was slowing down so we decided to reevaluate our corporate strategy. Over the years, we had developed over 30 years of expertise in machining, while also having facilities dedicated to chemical processing, painting, and assembly. In accordance with this portfolio of capabilities we realized that we could provide a unique value-proposition, as there were few aerospace suppliers that could provide this range of integrated services. In 2007 we initiated our aerospace activity by acquiring various approvals, and later that year, won a large contract with Bombardier, which earned us notoriety within the sector. Despite adverse economic conditions, we continued to invest in new certifications, contracts, and R&D. In 2011, we injected more capital into the business by taking on equity financing with three financial partners: Fond de Solidarité FTQ, Fondation CSN, and ACE Management. Since this time, we have achieved annual growth of 15 to 20 percent. While we are still a relatively new player in Quebec's Aerospace Cluster, we are one of its largest SMEs, with annual revenues of \$35 million.

**What is Meloche Group's vision?**

Meloche Group is currently positioned as a vertically integrated tier-3 supplier that has engineering, machining, special processes, and assembly capacities. Our vision is to become the leading Canadian owned tier-2 aerospace supplier in Canada, capable of major sub-assemblies, engineering, and risk-sharing. In an effort to achieve these goals, we have identified five strategic drivers of growth: technology investment, continuous improvement, front office infrastructure, customer proximity, and collaboration.

**As an integrated tier-2 supplier, what is Meloche Group's range of product offerings for the aerospace industry?**

Meloche Group specializes in the production of aircraft structural components and sub-assemblies; engine components; hydro-mechanical components; and interiors and cockpit systems components. The components that we work with are typically smaller than one meter<sup>3</sup> and the contracts that we take on incorporate all of our integrated solutions, which differentiates us from companies that are focused exclusively on machining. In terms of aerospace components we work with OEM/tier-1 customers such as Bombardier, Triumph, Mitsubishi, and Stelia Aerospace, and

our largest customer for engine components is GE Aviation, while we also work with Pratt & Whitney and Safran. We have also developed a worldwide niche for oil nozzles and fuel fittings. Going forward, we would like to take on projects that require more assembly work.

**Meloche Group now has four facilities. Provide us with an overview of these facilities and describe any recent investments in technology.**

Technology investment is a key business driver for Meloche Group, which is realized in the capabilities of our four facilities. We have three facilities in Valleyfield, each with its own specialization: CNC machining and engineering, surface treatment and assembly, and one reserved for administration, inventory management and future expansion. Our fourth facility in Bromont is dedicated to our work with GE Aviation. We recently invested in several new, five-axis machines, and in 2016 we will complete a three-year/\$11-million automation project with a robotized palletizer, which will afford us significant increases in capacity and reductions in labor costs.

**As Chairman of Aéro Montréal's SME working group, what role does continuous improvement play in supporting the cluster's international competitiveness?**

Several years ago with the inception of the SME committee, we began to think strategically about the role of SMEs in the cluster and in international markets. SMEs must strive for continuous improvement and differentiation, as the competitive landscape globally is much fuller today. In addition, SMEs should facilitate greater communication, because as a collaborative network we have much more to offer.

**Meloche Group has doubled its sales over the last four years. What do you attribute to these strong growth figures and what are some of Meloche Group's future goals?**

Meloche Group's growth performance is primarily attributed to its targeted investment in engineering, machinery, R&D and our development as a vertically integrated company. In the next five-years, our goal is to achieve annual revenues of \$100 million. We would like to grow organically, while also considering the strategic acquisition of companies with distinct certifications. Volume is critical to winning contracts in the aerospace industry, as major players are looking to work with suppliers that are financially credible and able to share risk. As we grow, managing our suppliers is going to become increasingly important. Furthermore, in terms of markets we would like to expand our presence into Ontario, Southeast United States, and later on into Europe. •

# Jacques Ouellet

CEO, NSE Automatech



*"NSE Automatech would like to move into the market of medium sub-assemblies, including mechanical and electrical parts."*

**NSE Automatech has integrated its manufacturing operations to include surface treatment, structural assembly, and electrical harness assemblies. To begin, walk us through NSE Automatech's range of service offerings and describe the profile of components that you typically work with.**

NSE Automatech manufactures engine parts, structural parts, critical parts, electrical harnesses, and tooling, such as assembly jigs, for the aerospace industry. We have historically specialized in machining, but have since integrated our operations to include surface treatment, structural assembly, and electrical integration. Using our expertise in high-precision machining, we are able to work with a wide range of exotic materials in the fabrication of complex components. We do not like to do what everyone else does, which is incorporated in our slogan: "dare to innovate." One of our key attributes is the delivery of complex parts or electrical harnesses under quick-turnaround.

**NSE Automatech recently consolidated its operations under one new larger facility. What effect has this had on your operations?**

NSE Automatech had three plants located in Granby (two manufacturing facilities and one surface treatment facility) and one at Ville St-Laurent (Electrical division), but we recently consolidated our activity (manufacturing facilities) within a larger facility which provides us with more capacity for our machines, we kept our surface treatment as a separated division near our new facilities. We have now installed new systems to ensure that our machines are used at a specific level of hours each days. Furthermore, we have three large monitors which allow us to monitor our on-time delivery, budget, and rejections. According to this process, our employees receive a bonus based on performance, which encourages them to work harder on quality and on-time delivery.

**With the integration of NSE Automatech's new capabilities and facilities, what type of projects will you be targeting going forward?**

Since the formation of NSE Automatech's new facilities, we are in the process of developing a large-scale project with a new customer. They approached us from a list of ten suppliers, and selected to develop us as their new strategic supplier. We are in process to be approved by them, and if all goes well, they will help us to become a worldwide strategic supplier.

**NSE Automatech actively collaborates with other companies within Quebec's Aerospace Cluster. Tell us about**

**some of these initiatives and their role within your overall operations.**

NSE Automatech works with Avior on its contract for the Boeing 787. Avior is an expert in composite and sheet metal parts, and we utilize our strengths by machining all of the aluminum parts for Avior on this project. This is a good opportunity for us because we gain the experience of working on a project for Boeing. The partnership is complementary because Avior has their own small machine shops, but they lack the required capacity for machining large volumes of parts. Accordingly, we make the tooling for another partner ATD (Aircraft Tool Design), by producing molds based on their tool design for a big customer located in the United States. We worked in close collaboration on this project and it was a success. We provided a quality product in a very short amount of time.

**How does NSE Automatech differentiate itself in the light of competition from lost-cost centers around the world?**

First of all, we do have a big problem with manpower. This is one of the reasons why we like to invest in robots and automation. If you buy a machine in Mexico, it is going to be the same price. If you have robots, you can be competitive, but there is no company in Mexico that can provide everything under the same roof. They are not integrated companies. One of our customers has a division in Philippines, but we were actually able to provide them with a lower quote due to our automation processes scenario. In Philippines, they have no automation. It is probably three to four people per machine. Here it is one person for two or three machines. The labor is cheaper there, but they just do not have the automation, which makes it completely different. This is why automation has to be a big focus going forward.

**What is NSE Automatech's strategic growth plan over the next three to five years?**

NSE Automatech would like to move into the market of medium sub-assemblies, including mechanical and electrical parts. We have all the knowledge and facilities now to provide medium sub-assemblies, but we want to develop this aspect of our business further. We are an integrated supplier, but only a small portion of work currently incorporates integration. Many of our customers are not familiar with our integration capabilities, so we would like to showcase them. We do not want to just make commodities, but to add value through assembly, surface treatment, and painting. It has to be there for all of our products. A dream of mine is to move more into medium sub-assemblies integrating mechanical and electrical components. •



*Rolls-Royce Canada employees performing maintenance on the AE3007 engine. Photo courtesy of Rolls-Royce Canada.*

# Reinforcing Quebec's Competitive Edge

## *Service and Equipment Providers*

While Quebec's aerospace cluster enjoys a favorable ecosystem of OEMs, integrators, and sub-tier suppliers, it also contains an array of small-to-medium enterprises (SMEs) and multinational companies that play critical support roles within the industry as specialized providers of services and equipment. This group of companies has expertise in fields that include engineering, surface treatment and special processing, maintenance, repair, and overhaul (MRO), tests and controls, and human resource management. While varied in focus, each of these companies adds depth to the industry's capabilities by sharing a common trait: the ability to remain agile and provide value-added solutions.

Multinational service providers have long been attracted to Quebec's aerospace cluster due to its auspicious business environment and growing market potential. Rolls-Royce was one of the first multinational service providers to establish operations in Quebec. In 1947 it instituted a

center of excellence for engine MRO services, Rolls-Royce Canada, which serves the needs of more than 600 aircraft operators in 30 countries. As an employer of nearly 1,000 technically trained employees, it has cited the local industry's pipeline of human capital as an essential element to the company's success. Each year Montreal universities, technical colleges, and trade schools produce more than 4,500 graduates for the field of aerospace. The reality of aging aircrafts is a riding issue within the global aerospace industry. Recognizing this need, Quebec has emerged as a global hub for comprehensive MRO services. Innotech-Excaire provides maintenance and refurbishment services to business aircraft the world over, with more than 80% of its business derived from international customers. Turbomeca Canada and Avianor, which serve the engine and cabin interior markets, respectively, add to the robust composition of Quebec's MRO sector. Tony

Rawlinson, director of sales & marketing of Innotech-Excaire, said: "The Quebec aerospace cluster is reliant on a dynamic workforce and the launch of innovative products that the world wants."

Quebec is also home to a myriad of uniquely specialized engineering firms that seek to provide the industry with new technologies. Assystem, a multinational engineering firm well-rooted in the European aerospace market, established operations in Montreal over 10 years ago as the locus of its strategy in the North American market. It strives to leverage its experience in the European market by bringing new design, materials, and technologies to Quebec. Jeff Hoyle, vice president Aerospace of Assystem, said: "In order to penetrate the North American market, you have to demonstrate competency in this value-stream."

Through its design of innovative technologies, Adetel Group recently entered the Quebec aerospace market under the

banner of Adetel Canada, seeking to drive down fuel-related costs for various next-generation aircrafts.

Applying innovative solutions to pressing market needs is a critical determinant of competitiveness within the aerospace industry. SMEs within Quebec's aerospace cluster are afforded a unique window to leverage local resources and meet the industry's innovation needs. Provincial consortiums such as CRIAQ, and federal programs such as CNRC IRAP, have a notable impact on spurring cost-effective research and development (R&D) within the industry. SMEs that undertake joint R&D projects with CRIAQ have realized return on investment (ROI) ratios ranging from one to 44.

Alternatively, CNRC IRAP provides zero-interest loans, grants, and industry contacts to SMEs for the development of innovative products. "The CNRC IRAP is an invaluable resource for SMEs", said James Groundwater, general manager of Beel Technologies.

Under this program, Beel Technologies was able to develop its latest generation

secondary surveillance radar (SSR) monitor for air traffic control application.

The segment of special processing and surface finishing is one area that is undergoing considerable change. Given the industry's transition towards consolidation, processing shops must refine their operations and improve on-time delivery while expanding their capabilities in order to secure contracts with larger players. Jean Magny, president of Genius Solutions, said: "Smaller players need to have certain tools in place in order to meet industry best practices and the high standards that large players expect."

Enterprise resource planning (ERP) systems, such as those offered by Genius Solutions, is one way in which SMEs can improve their processes. Industry dynamics have caused many shops to make substantial changes to their internal processes. Marc Brindamour, general manager of Tekalia Aeronautik, discusses the needs of refining its internal processes: "Everything involved in quick-response manufacturing revolves around flexibility and ensuring that everyone within the organization is

aware of processes. Accordingly, we have taken great strides to analyze the setup, layout, and execution of our processes. We assess the pace, beat, and rhythm of our processes to ensure solid production flow."

Tekalia Aeronautik provides surface finishing solutions for landing gear components and is in expanding its capabilities to include the processing of titanium parts, in order to address diversified customer needs.

By advancing technological changes within their processes, other surface finishing specialists are also advancing technological changes within their processes. Guy Levasseur, president of Aerosphere, indicates that: "In the next three to five years, we are planning on implementing robotic shot peening processes to our work capability."

Through agility, innovation, and continual process improvement Quebec's service and equipment providers have showcased their ability to remain vigilant and responsive to shifting industry trends, and in turn, reinforce the province's competitive edge. •



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# Nancy Venneman

President, Altitude Aerospace



## What service offerings does Altitude Aerospace provide?

Altitude Aerospace has been providing engineering support to the aerospace industry for the last 10 years. We have been supporting the development of some of the most challenging and exciting new aircraft programs, but have also been providing in-service support to airlines and MROs.

Altitude Aerospace was initially founded to provide modification and repair support for aircraft in-service. We developed Supplemental Type Certificates (STCs) for airlines and also provided engineering repair services on accidental damage to aircraft. We develop turnkey solutions for airlines which included the conceptual design, engineering substantiation, certification and production of STC kits through a partnership with a Transport Canada approved manufacturer, Trinity Aerospace.

Our team has worked on a wide range of aircraft types and is very knowledgeable in the certification process with Transport Canada and foreign authorities. This is what sets us apart from our competitors.

## What are some of the core competencies and specialization of Altitude Aerospace's engineering teams?

Altitude Aerospace's core competencies are in aerostructures and in the support of aircraft structures. Our team has supported the development of large structural sub-assemblies such as aircraft doors, fuselages and wings. Weight reduction and optimization is also one of our key strengths. This is currently the prevailing trend in aerostructures. It is what allows the end user to operate an aircraft more efficiently. It has long been a focus but even more so in the past few years, as there is heightened competition between aircraft manufacturers to create

*"Altitude Aerospace's core competencies are in aerostructures and in the support of aircraft structures. Our team has supported the development of large structural sub-assemblies such as aircraft doors, fuselages and wings."*

the best product operating at the lowest cost possible.

Our team is very versatile and is also capable of supporting a full aircraft repair project. If an aircraft is subject to accidental damage, for instance a fuel truck comes into contact with the fuselage of an aircraft. Altitude will deploy a team on-site to carry out a damage assessment. We will then define the components to replace and prepare the engineering to repair its structure to bring the aircraft back to an airworthy state. We have the necessary knowledge and the capabilities to take on these kinds of projects.

## In 2013, Altitude created a strategic partnership to acquire a local manufacturing firm. How does Altitude Aerospace intend to position this network of companies in the coming years?

Altitude acquired a precision machining manufacturer, DICI Industries, in a joint venture with Trinity Aerospace. This has allowed us to expand our services to include manufacturing, machining and sheet metal, but more importantly it has allowed us to integrate our services from engineering to manufacturing. DICI Industries is very active in the defense, electronics and medical industries. We like the diverse nature of this business as aerospace tends to be very cyclical. We see this as an opportunity for Altitude to bring some engineering expertise to these fields, though we obviously are interested in increasing the aerospace content at DICI. •



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ENGINEERING  
AT THE HEIGHT  
OF YOUR  
EXPECTATIONS**

We specialize in conceptual design, structural analysis and certification both for the development of new aircraft programs as well as support for existing aircraft fleets.

# Jeff Hoyle & Michel Ohayon

JH: Vice President Aerospace

MO: CEO North America

Assystem



## **Assystem is a global enterprise with a storied presence in the European market. To begin, please provide us with an overview of Assystem's global operations and its involvement in the North American market.**

MO: Assystem is an international engineering and innovation consultancy, which has a presence in 21 countries throughout Africa, Asia, Europe, the Middle East, and North America. Globally, we have a workforce of over 11,000 employees, of which 4,000 are dedicated to aerospace. Last year our operations generated €870 in annual revenue.

JH: We have historically been well positioned within the European market, as much of our activity comes from France, Germany, and the United Kingdom. Over 10 years ago, we recognized that in order to achieve desired levels of growth, we needed to expand into North America. The plan has been to leverage the strengths of our global network through the organic development of engineering operations, while also considering strategic acquisitions in order to augment our presence. Ultimately the goal is to grow our North American footprint so that its revenues rival that of our operations in Europe. Today, we have offices in Montreal, Quebec; Wichita, Kansas; Mobile, Alabama; and a strategic partnership in Seattle, Washington. We are also looking at a number of other locations in North America in order to support our global customers, such as Rolls-Royce.

MO: Assystem's Montreal office opened in 2004 and has been the focal point of our strategy in North America. Quebec provides an interesting market to Assystem due to the breadth of its aerospace cluster, which has enough suppliers, technology, and competency to build an entire aircraft.

## **What services does Assystem provide the North American aerospace market?**

JH: Assystem is an expert in providing value-added engineering solutions to its customers. We have experience building relationships with well-established companies and providing wide-ranging services on projects that require complex engineering solutions. Through leveraging our experience in the European market and drawing upon our global network, we deliver the North American market a strong value-proposition.

MO: The services that we provide the North American market include work in aerostructures, gas turbine engines, mechanical and electrical systems, embedded systems, and interiors. While we might not specialize in all of these disciplines locally, we are able to leverage our global network to ensure coverage of all of our local customers' diverse needs. Furthermore, we have institutes in which our engineers are provided with specialized training in distinct fields, such as the automotive, aerospace, and

nuclear industries. This affords our employees the opportunity to develop wide-ranging expertise and to crossover and apply this know-how to the aerospace industry.

## **Please describe Assystem's workforce in Montreal and what types of projects it works on?**

JH: Within the global organization, it is imperative to have local experts, and Assystem's Montreal office supports both local markets and our global network. Specifically within Canada, we are focusing on the production environment, as this area offers strong growth potential.

MO: In Montreal we have 70 employees dedicated to the aerospace industry. Within this framework, we have teams working on projects that concern design, analysis, and support of our local customers. Much of our past activity in Quebec was focused on aerostructures, but we are currently more focused on all stages of engineering, manufacturing, and production support. This is one of our value-propositions as we are able to manage multiple phases of production.

## **What is Assystem's global strategy and how does North America tie into its development plan?**

JH: As a global organization, you have to respond to the demands of your customers. Assystem's strategy is to deliver cost-effective complex engineering solutions across the world. Ultimately, the goal is to expand our presence from Europe to include North America and Asia. Each of these offices will then be able to create added value for our global network. For instance, we have offices in India, which affords us a cost advantage for certain activities. Furthermore, it is important to be well positioned globally in order to support our existing customers and attract new customers.

## **Looking forward, what are some of Assystem's key goals?**

JH: Assystem identifies strong growth potential in aerospace and general engineering activities. In the next five years, we would like to take our Global Product Solutions division, which includes the aerospace and automotive industries, from €500 million to €1 billion in annual revenue. In order to accomplish this, we will continue to offer solutions to more complex problems, while moving into new markets. Basic engineering can be done anywhere in the world today. Accordingly, we will look to differentiate ourselves through innovation: new designs, materials, and technologies. In order to penetrate the North American market, you have to demonstrate competency in this value-stream, which we intend to do by applying our expertise from the European market. •

# Benoît Morin

Vice President, Adetel Canada



*"Adetel is currently working with different groups on the development and provision of technologies related to electrically-driven systems for the powering of aircraft engines."*

## **Adetel Group initiated its presence in the Canadian market with the formation of Adetel Canada in 2012. To begin, describe the evolution of Adetel's presence in Canada and the rationale behind its move into the Quebec market.**

Prior to Adetel Group's move into the Canadian market, it had long considered opening facilities in Quebec. Its rationale was based on the fact that Montreal offers the third largest concentration of aerospace activity in the world. It took time to identify appropriate facilities, programs, and fiscal support, but in October 2012 we initiated our move into the Canadian market with the formation of Adetel Canada (Adetel). Situated in Saint-Hubert, Adetel has grown its staff over the last two years to include 100 employees: today, we have one of the largest aerospace and rolling stock engineering facilities in Quebec. During our time here, we have enhanced our presence through the development of business activities with aerospace companies such as Thales and Pratt & Whitney.

## **What industries does Adetel target with its work in Canada?**

Adetel's focus in Canada mirrors that of the group's global activity. We are a specialized engineering firm that works in the development of embedded electronic systems for critical environments. The two principal industries that fall under our purview are aerospace and rolling stock. These industries account for roughly half of our turnover, while we also work in fields as distinct as the medical and military sectors.

## **How do you apply your solutions to the aerospace sector?**

Adetel designs embedded electronic solutions for the aerospace sector. The application of these solutions includes data acquisitions and analysis, electricity, fluid,

speed, and weather for aircrafts computer system. Another important segment we cover for aerospace is the energy environment of an aircraft; providing solutions centered on energy saving and stocking.

## **What are some of Adetel's ongoing projects within the aerospace sector?**

Adetel is currently in the process of developing an electrical battery management system for the aerospace industry, which will provide its aircrafts with one-hour autonomy on the tarmac prior to starting the engine for takeoff; electrical utilization in this form could provide fuel related cost, while also proposing strong benefits for the environment. This is all part of our green aviation strategy. In an effort to maintain our cutting-edge technology, the group is investing over 10% of its turnover on research and development initiatives. In Canada, we are currently developing a test bench for Pratt & Whitney's new turbine technology, which will change its current method of driving. We are also working on another project with Thales Group in Quebec focused on the exploration of new technologies for hardware systems, which will complement its software systems. Adetel also works closely with Varitron Technologies and C2MI; strategic relationships such as these enhance our presence as a one-stop-systems-shop.

## **C2MI is an organization that aims to bridge academic and industrial sectors, assisting in the commercialization of microelectronic products. What is your relationship with this organization?**

C2MI is a spin off between IBM and Teledyne DALSA. Its primary purpose within Adetel's operations is as a testing center for microelectronics; its facilities enable us to ensure that all of our electronics are viable with efficiency in excess of 99.99

percent. C2MI plays a significant role within Quebec's Aerospace Cluster and its activity is essential for us within the aerospace sector, as it provides assurances that we can pass on to our customers.

## **Looking forward, what innovations do you have in the pipeline for the aerospace sector?**

Adetel is currently working with different groups on the development and provision of technologies related to the electrification of aircraft systems for the powering of engines. Ultimately this solution will mitigate an aircraft's carbon emissions while making its engine more effective. The evolution of this type of technology is apparent in Airbus' line of new engine option (NEO) aircrafts and Bombardier's C Series. With the implementation of new technology, these aircrafts will be more efficient and resistant; less noisy; and consume 20 percent less fuel. Cabin pressurization will also be applied at lower altitudes, for instance 2,000 feet rather than 6,000 feet, resulting in an improved cabin environment for passengers.

## **What are some of Adetel's goals for the next three to five years?**

Over the next three to five years, Adetel will focus on maintaining its customer base and will continue to collaborate with its customers on research and development (R&D) activity. We also have the goal of expanding our North American presence; accordingly, we are in the process of increasing our activity on the west coast through our facilities in Fremont, CA and Seattle, WA. Our overarching goal is to be recognized as a major player within the aerospace industry. •



# Marc Brindamour & Erick van de Water

MB: General Manager  
EVW: Program Manager  
& Business Development,  
Tekalia Aeronautik



## **Tekalia Aeronautik is a one-stop-shop for surface finishing solutions, specializing in the market for landing gear components. In recent years, what has been the focus of Tekalia's operations?**

Tekalia Aeronautik (Tekalia) has recently benefited from strong increases in business volume, primarily from Boeing and Airbus. In 2015 we expect growth rates of 30 to 40 percent, while in 2016 we forecast growth of 20 percent. While we have not added a substantial amount of employees to our workforce, our focus has been on transforming the business through the improvement of internal processes. Accordingly, we have taken great strides to analyze the setup, layout, and execution of our processes. We assess the pace, beat, and rhythm of our processes to ensure solid production flow. Our goal is to incorporate this flow within all of our processes and to be seen as the quickest one-stop-shop in terms of deliveries and responsiveness. This process stems from the training that we provide and the capabilities of our management team as they instill lean manufacturing and operational excellence within our activity. Everything involved in quick-response manufacturing revolves around flexibility and ensuring that everyone within the organization is aware of processes; consequently, this has been the focus of our recent efforts.

## **How does Tekalia perform in terms of on-time delivery?**

Generally speaking, the industry requirement for on-time deliveries (OTD) is 95 percent, which is Tekalia's ultimate goal. We are climbing to reach this level and will likely achieve it by 2016. We have al-

ready achieved this standard for several of our customers. Our "TEAM" approach (Tekalia's Engagement to Achieve More) has enabled us to hover at almost 90% OTD since the beginning of our Fiscal Year (Oct. 2014).

## **Tekalia works primarily in the surface treatment of landing gear components. What is the typical profile of components that you work with and what steps are you taking to further diversify your service offerings?**

While Tekalia's plating tanks are adequately sized to process large components, a fair amount of our work comes from small to medium sized components. We currently process wide body main fittings to the smallest of pins, and everything in between. As a one-stop-shop we accommodate and supply all of our services at a single location, which makes it easier for customers to work with us. As our customers require diversified services, we are currently in the process of transforming our capabilities to include processing of titanium parts, in addition to aluminum and steel parts for which we already have gained an expertise.

Furthermore, we are in the process of developing Zinc-Nickel plating, as the demand has increased significantly from our customers. Also, we are currently expanding the range of specifications for which we can encounter for each service by developing products from other OEMs, notably Bombardier and Embraer. We are consolidating the knowledge we have, we are mastering the complexity we have, and we are synchronizing all of those steps together. •



**THE STRENGTH  
OF OUR TEAM TO  
SUSTAIN YOUR  
GROWTH**



Tekalia offers a "one stop shop" solution for Surface Treatments of the Aerospace Landing Gear sector. Our TEAM's dedication to quick response manufacturing, alongside its quest towards operational excellence, has enabled Tekalia to stand out as a trusted partner within the industry. As we continue to build on our integrated relationships with our Customers, our main goal remains to secure the Supply Chain and support the industry's remarkable growth for the future.

# Guy Levasseur

President, **Aerosphere**



*"In the beginning of 2007, we focused our efforts on the operations side, which was a particularly significant milestone for us, and led us to our position in the market today."*

**Aerosphere began its operations in 2004. To begin, please walk us through the evolution of your company and describe any recent milestones that have contributed to its presence in the market.**

Initially, Aerosphere offered consulting services in the fields of shot peening and peen forming. However, we rapidly realized that there was a missing piece in the aerospace puzzle. At the time there were some companies capable of providing shot peening and peen forming on smaller parts, and others on larger parts, but not on both efficiently. We recognized the need for a company specialized in providing these services to both ranges of parts in one shop, but mostly economically, and with a reliably fast turnaround. In the beginning of 2007, we focused our efforts on the operations side, which was a particularly significant milestone for us, and led us to our position in the market today. Aerosphere's expertise extends from shot peening, shot peen straightening, and peen forming on aircraft structures and wing control surfaces, to glass bead peen-

ing and cleaning using automated and manual equipment.

**What is the breakdown of projects that Aerosphere is currently working on?**

Aerosphere has regularly over 100 work orders in process. We segment these work orders into various tasks since each work order may include different operations or processes. Some of these operations are internal and some are external and are performed by our network of subcontractors, but we manage them in the same manner. We have to be very performant because our lead time is short, customers are demanding, and components are costly. We have no room for error. Our customers demand "One-Stop-Shops" and this is what we provide with our network of subcontractors who are as devoted as we are to maintaining high quality standards and on-time delivery. The key to our success is our unique combination of "customer first" approach and tools we have developed to accomplish this.

**What is Aerosphere's strategic growth plan for the years to come?**

In the coming years Aerosphere intends to double the size of its facilities. In the next three to five years, we are planning on implementing robotic shot peening process to our work capability. It takes roughly one year to order and certify this kind of equipment. We already have a lot of demands for this type of process and we are confident this will lead to other new business opportunities. Furthermore, back in 2008 we decided to develop Automated Peen Forming (APF) for wing forming with a German partner. At the time, the market was not ready for this type of technology; however, because the technology is evolving, the need will increase since the technology will become more and more affordable. There are many different components to the wing; therefore the investment related to APF provides as a long term solution to manual forming which is dependent on operators to perform the Forming operation. In the next three to five years, we plan to incorporate this technology in our facility in Montreal.



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 guy.levasseur@aerosphere.ca **www.aerosphere.ca**



## Michel Martel

General Manager,  
TNM Anodizing & Paint



*"TNM's load capacity and throughput set it apart from others in the industry. TNM actively invests in new equipment, and the size of its tanks gives the company an advantage."*

**TNM Anodizing & Paint offers a range of finishing solutions to the aerospace industry. To begin, please describe the range of services included in your portfolio.**

TNM Anodizing & Paint (TNM) is a one-stop-shop for finishing solutions. Our services include non-destructive testing, anodizing, painting, and shot-peening; these services can be applied to aluminum, titanium and steel parts. TNM is capable of handling large volumes and everything that the company does is done with an emphasis on quality. Turn-around time is perhaps TNM's strongest feature. Over the years we have refined our processes to achieve + 95 % on time delivery; we are consistently on time and have a very aggressive lead time which we use to measure our on time delivery.

**What are some of the differentiating features of TNM's one-stop-shop?**

TNM's load capacity and throughput set it apart from others in the industry. TNM actively invests in new equipment, and the size of its tanks gives the company

an advantage. TNM presently has available capacity and is going to expand and increase its capacity further through new processes and automation.

**TNM recently undertook a phase of restructuring. Describe this process and the results you have since achieved.**

In 2013, TNM realigned its business and set off down a track of positive change. We analyzed our business and listened to our customers' needs and requirements: on-time delivery and a high standard of both quality and service. After following our plan for three to six months, we were able to achieve +95% on-time delivery and ensured that quality followed the same trend. We also made service part of our culture. At this point many people within the company were keen to take on more business; however, we made the executive decision to hold-off and sustain this level of timeliness and quality under the principle that once we became robust internally, business would follow. This strategy worked.

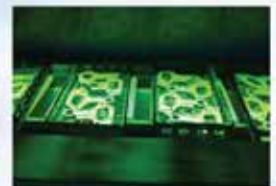
Prior to 2012, we were losing money near-

ly every year; we then climbed back and were able to break-even; by 2014, we became profitable. By following our strategic plan, sales have increased from around \$3.5 million to \$8 million annually and have sustainable profitability.

**What are some of the forces that contributed to this significant change within TNM's overall operations?**

The processing business is well-established, the basics of which have not changed much over the last 50 years. What has given us the opportunity to move past other companies is that we are doing many different things to refine our processes and achieve results. For instance, TNM is compliant with Bombardier's 5-star program, despite the fact that it has been temporarily put on hold; the reason being that it helps achieve results. Inside the shop we are optimizing and improving many of our processes, constantly analyzing our approach and reviewing how we handle lot batches as an example, all of these components become an advantage.

## FINISHING IS ONLY THE BEGINNING



TNM is specialized in surface finishing for the aviation industry. TNM's goal is to provide their customers with a "one stop shop" for all surface finishing processes. Our mission is to be amongst the elite processors for surface finishing. We are committed to provide superior value and service to our customers.

**TNM has:**

- Approvals for all Major OEMs
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# Nicolas Nassr

President, Verdun Anodizing and  
Ultraspec Finishing



*"Ultraspec and Verdun will continue to operate as separate entities, while interacting and offering each other key synergies."*

**Over the course of the last 80 years, Verdun Anodizing has experienced significant transformation. Furthermore, it has recently expanded its capabilities through the acquisition of Ultraspec. To begin, please walk us through the evolution of Verdun Anodizing and Ultraspec Finishing.**

Verdun Anodizing (Verdun) was founded in 1935 and was the first anodizing shop in Canada. In 1990, the business changed ownership and was brought to the next level through the acquisition of aerospace certifications and the formation of strategic alliances within the industry, which established its presence as a comprehensive finishing solutions provider for the sector. When I acquired the company in 2010, we had a workforce of approximately 45 employees; today, we have grown our operations to include 75 employees. Over the years we have developed our name as a respected surface finishing shop and have achieved many of the aerospace industry's most stringent certifications. Our list of aerospace approvals include: Boeing, Bombardier, Héroux-Devtek, Bell Helicopters, Lockheed Martin, and Messier-Bugatti-Dowty. In 2013, we responded to our clients' request for one-stop-shop solutions by acquiring Ultraspec Finishing, which enabled us to offer inspection, anodizing, plating and painting services, while Verdun is specialized exclusively in anodizing. Ultraspec has since grown its workforce from 26 to 45 employees. Upon acquiring Ultraspec, we created and certified a non-destructive testing (NDT) department, added boric sulfuric certifications for Boeing, and NDT certifications for Boeing, Pratt & Whitney, Messier-Bugatti-Dowty, Héroux-Devtek and Goodrich. New green technologies are also being incorporated into our portfolio, such as zinc and nickel, which replace cadmium plating. We have also achieved NADCAP certification for magnetic particle inspection (MPI).

**In addition to Verdun Anodizing and Ultraspec, you are also in the process of building a new facility dedicated to surface finishing solutions. Provide us with a breakdown of these different businesses and the solutions they provide Quebec's aerospace industry.**

Ultraspec and Verdun will continue to operate as separate entities, while interacting and offering each other key synergies. Both companies have unique strengths and complement each other by providing different solutions for distinct customer needs. The group's corporate plan is to increase its business volume threefold within the next two years. This will be realized through the construction of our new 40,000 ft<sup>2</sup> facility in Dorval, which will be one of the largest processing plants in Canada, for which start-up is imminent. The new plant will initially handle new commercial and transport business and ultimately offer more comprehensive solutions to the aerospace industry.

**Within these three business units, how extensive is your portfolio of finishing solutions and what is the extent of your tank capacities?**

We benefit from a diverse product portfolio, which is especially notable in Ultraspec's plating and anodizing solutions. Many of our tanks are dedicated to the aerospace industry, and we have increased this capacity by adding zinc nickel plating. We have some of the largest tanks in Montreal, and in response to the needs of our customers, we will be adding even larger tanks. Our facilities are currently operating below capacity, but we remain confident that volumes will increase significantly in 2015 and 2016 due to the Bombardier C Series and the ramp-up of Boeing and Airbus production. The integrated finishing solutions that we provide are particularly relevant given the climate of projected increases in production for 2015 and 2016, for which the biggest issues are capacity and on-time delivery.

**What is the strategic growth plan for your businesses going forward?**

Overall, the group is investing more than all of its local direct competitors combined. With this level of investment, our objective is to be the market leader in terms of quality staff, machines, and innovative processes, which will all be supported by new infrastructure. The new 40,000 ft<sup>2</sup> facility will be fully automated; its capacity will take us to the next level and allow us to become the largest finisher in Montreal. A further goal is to develop a strategy which encourages customers in the United States to identify us as their preferred supplier for finishing solutions.

**As your business continues to grow, what measures are you taking to mitigate the environmental impact of your operations?**

We take environmental impact seriously, and have continuously invested in environmental solutions. The new facility will be one of the greenest for surface finishing solutions. The new facility will include: state-of-the-art filtration systems for air and water; 100 percent recuperation of heat generated by processes, which will be used to heat the building; and minimal chemical waste with tight controls on the amount of chemicals used, due in part to automation. Ultraspec's facility already conforms to all environmental rules, while we have further improved the facility's environmental performance by installing chrome scrubbers that exceed Quebec's stringent air emission rules to the standard of California's 0.006 mg/Amp Hour of Chrome Emissions. Verdun's facility is limited for space, but we have installed a new fully computerized system, which conforms to Quebec's environmental standards and includes waste water treatment. •

# Claude Lauzon

Corporate Vice-President,  
CEL Aerospace Group



**CEL Aerospace Group has over 25 years of experience in the field of engine test solutions for the aerospace industry. To begin, please describe the evolution of CEL Aerospace Group and its range of testing solutions.**

CEL Aerospace Group (CEL Aerospace) initiated its presence in Quebec's Aerospace Cluster in 1988 as a developer of engine test solutions for Pratt & Whitney Canada. It has since expanded its range of testing solutions and global customer base to include civil and military engine maintenance providers as well as many OEMs around the world. There are three primary markets for the application of aerospace engine testing solutions: R&D, manufacturing, and maintenance. Each of these markets requires distinct testing solutions, which we provide accordingly. We design, develop and commission test cells for auxiliary power units (APUs), turboprops, turboshafts, small and mid-size turboprops.

**Although CEL Aerospace is relatively small, it offers an array of testing solutions to its customers. What is the breakdown of your workforce and business units?**

CEL Aerospace is composed of over 75 employees located in Canada, Europe and the US. We delivered, over the course of our 27 year history, over 700 different projects. Our retention rate is high, which has contributed to deep levels of expertise related to the design of efficient and effective engine testing solutions. Overall, our team is highly innovative from a technical perspective and works on a consultancy basis in its approach. Accordingly, we are able to provide our customers with creative and cost effective solutions that are tailored to their specific needs. There are three primary units within our operations: mechanical design, instrumentation, and data management. We

*"There are no other players in the world capable of covering the range of engines that we do, in particular the APU, Turboprop and Turboshafts."*

have teams of civil and mechanical engineers dedicated to the mechanical design of our engine test facilities, from physical layout, test bed specifications to intake, exhaust and aero-acoustic design. Another team is focused on the sophisticated instrumentation that engines require, considering aspects like temperature, pressure, and vibration. Finally, our software engineers maintain and develop our proprietary data acquisition system, CEL-DAS® and evolve concurrently with latest technologies. We benefit from a strong cadre of program managers insuring on-spec, on-time, and on-cost solution delivery to our clients.

**What is the competitive landscape globally for engine testing solutions?**

Globally, there are fewer than 10 companies active in the market for test cells, many of which are polarized in terms of size. Several players target the market for large, turboprop projects, which require more expensive test cells and construction management, while others are focused in different niches, such as the offering of specific product lines to OEMs or the military market. Overall, there are no other players in the world capable of covering the range of engines that we do, in particular the APU, Turboprop and Turboshafts, where we are leaders. We are unique in the respect that we offer an extensive range of products to OEMs and independent MROs around the world. We also have a credible portfolio, which demonstrates our accomplishments and reputation for on-time delivery and quality. •



## Building test solutions



We design, develop and commission fully integrated aviation gas turbine test cells for OEMs and independent Maintenance Organizations; we specialize in APUs, Turboprops, Turboshafts, small and mid-size Turboshafts. Our expertise also covers related systems and components, for aerospace and industrial applications. CEL is headquartered in Canada with capabilities in Poland and the USA, we are 80 people strong and have delivered over 700 projects over a quarter century.

CEL is a project-oriented company. It is structured to perform consistently at all levels of its diverse service and product offering, from the design of state-of-the-art test cells and data acquisition systems to the delivery of operational turnkey test facilities, anywhere in the world.

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# David Thibes

General Manager,  
Turbomeca Canada



*"Turbomeca has a network of maintenance providers across Canada that manages first and second line maintenance for our engines."*

**Turbomeca Canada's operations are focused on providing its customers an alternative for repair, overhaul, and maintenance of equipment. In line with this mission, what new programs does Turbomeca Canada have underway for the maintenance of its helicopter engines?**

Turbomeca Canada (Turbomeca) benefits from a breadth of technical capabilities, which allows us to provide services that cover all types of engine maintenance. We are currently in the test phase for our Bank of Online Services and Technologies (BOOST) platform, which is a program we have developed with IBM to offer our customers new services related to maintenance and navigability. BOOST is a highly secure and comprehensive platform that facilitates visibility for maintenance and follow-up work on our engines. In addition to enhanced maintenance predictability, customers are also able to order online any spare parts that are required for their specific engine configurations. We have several engine configurations, so consolidating maintenance information through this platform will allow us to provide improved services to our customers. Additionally, we have teams available 24 hours a day, seven days a week to support aircraft on the ground. Many of our customers are working in remote locations across Canada, so it is critical that we are able to support them when they have urgent needs. Accordingly, we can send them a technician on-site, or they can send their module or engine to our facilities to be repaired.

**As many of your customers are dispersed throughout Canada, what is the extent of your network of maintenance providers?**

Turbomeca has a network of maintenance providers across Canada that manages first and second line maintenance for our

engines, affording us close proximity to our customers, while we are the exclusive provider of third line maintenance for our engines in Canada. In terms of maintenance, repair, and overhaul (MRO), we allow other companies to work on our engines under licensing agreements. The ultimate goal of our operations is to ensure customer satisfaction at a competitive price so that our customers will continue to fly with Turbomeca engines.

**What is the driver of Turbomeca's activity in Canada?**

As the focus of Turbomeca's operations in Canada is on the service of its engines, our operations are not directly impacted by the activity of airframers, but rather by the operations of our customers in the field. Consequently our business is driven by the activity of our customers in areas such as the construction of dams and communications towers, exploration of mines, inspection of power lines, and natural resource surveys. Accordingly, our business is affected wherever there is a need for helicopters.

**What is the economic outlook for these different fields and what implications do they hold for Turbomeca's growth?**

We have seen a slow recovery since the 2008 crisis, especially given last year's oil and gas developments. Although mining activity has been low over the last few years, it has been compensated by activity within the oil and gas sector. With that said, the recent declines in oil prices will certainly have an impact on our operators. We have already seen many investments cancelled or postponed. Accordingly, we forecast light growth and stabilization over the next one to two years. Canada benefits from an immense reserve of natural resources, and worldwide growth will certainly encourage demand, so we are

confident that growth will continue in the coming years. With that said, it is unclear when this growth will occur. We need for our operators to have one or two consecutive years with solid flight hours and revenues in order for them to consider significant reinvestment in their fleet. In terms of fleet renewal, it will likely take several more years before this takes place.

**What is Turbomeca's strategic growth plan for the next three to five years?**

In the near-term, Turbomeca will focus on developing new partnerships with maintenance providers to ensure close proximity with our customers. The development of new service centers will be a defining aspect of our activity next year. There are over 2,000 helicopters flying in Canada and approximately 600 are more than 30-years-old. This creates an environment of vast potential for helicopter replacement. We hope for favorable economic conditions in the coming years, which will encourage our end users to accumulate more flight hours on their engines. Furthermore, we hope that the economy will create a demand and need for new helicopters.

**Do you have any final message for our international readership related to Quebec's Aerospace Cluster and its capabilities?**

Overall, Montreal is a very good place for business: it is a place where the capacity and knowledge is really amazing. Quebec's Aerospace Cluster benefits from a strong network and set of capabilities, which has established its presence as a unique model for the rest of the world. In an effort to encourage growth, it is essential that the government continues to support initiatives that will bring OEMs and suppliers to the Cluster, in order to grow the energy, strength, and competencies that we have here. •

# Earl Diamond

CEO, Avianor Inc.



*"Avianor has the largest wheel and brake shop in Canada and is opening up a shop in Calgary to be closer to the Western airports."*

## **Can you give a brief history of the company and some of the milestones over your 20 years in the aviation industry?**

Avianor is celebrating its 20th anniversary this year. The company started off as a very small shop making galley carts and doing some work for Bombardier. The company then got design rights for making seats and the interior side of our business was built up from that. From 1998 to 2000 we were doing job manufacturing and distributing parts, mostly related to cabin interiors. Together with my partner, Sylvain Savard, we have grown the business and in 2000, we acquired another company called MAS (Mirabel Aero services). After the acquisition, we had the ability to incorporate repair and overhaul on interior components, with a particular focus on cabin seats. Avianor has the largest wheel and brake shop in Canada and is opening up a shop in Calgary to be closer to the Western airports.

## **What are the main products that Avianor offers to the airline industry?**

Wheels and brakes is one of our main products, but it is still only one part of the business. Avianor also offers engineering certification services. Another product offered to the industry is spare parts. The company buys, sells and trades parts, which is one of our competitive advantages, as we offer something that no other company in the world offers. Avianor is also a Part 21 approved manufacturer of cabin interior components, most notably for pilot seats. Avianor also offers maintenance, repair and overhaul (MRO) for aircraft, and we are approved by Transport Canada to work on a number of different types of aircraft.

Our company is not competing with the big MRO companies, as the big players are selling manpower and Avianor is instead selling a service to its customers.

The primary effort in terms of our MRO is cabin integration and optimizing downtime. Avianor understands what we have to plan and has the skills, experience, material and people on site to address any unforeseen circumstances to mitigate any delay. This is the differentiating factor between Avianor and the big players in MRO. We offer service and problem mitigation.

## **Can you elaborate on the growth and expansion of the company over the last few years?**

The sum total of all of our four facilities is about 300,000 square feet. We have the main plant here where the administration, engineering and seat shop is based and the manufacturing is also done here. Across the street is the wheel and brake shop and we also have a large warehouse. The fourth building is the hanger, which is 50,000 square feet, with another 50,000 next door, which we can rent as needed. The company is continuing to grow, but we are currently in a recovery mode, as we had a bad investment in 2012, which had an impact on our cash flow and ability to grow.

## **Avianor worked with Gulf Air and has done projects for Air Canada. Can you elaborate on the company's successful projects with major airlines?**

Avianor worked with Gulf Air, which was a difficult project. As it is a state-owned company, decision-making was slow, and it took nearly a year to close the deal. We did, however, build a strong relationship with the airline and ultimately realized that we should be in control of the management of the project. There were some challenges and delays in terms of the seats, but Avianor still completed all of the aircraft. The company also manufactured some parts and used all of the tools in its toolbox. We also changed the in-flight entertainment system and put in a state of

the art entertainment system. Finally, we had some design responsibility. Despite the challenges, Avianor hopes to work with Gulf Air again in the future, as the only success of a project is the next order.

In terms of Air Canada, it was a completely different experience. Air Canada had in its mind what it wanted to do and it involved us early on. Avianor suggested what we could offer the airline for the project, and it had to decide how much it wanted to take on. Some of the materials used were manufactured by the company, and we had some stock in our warehouse. Avianor was asked to quote on the MRO, but we also proposed that Air Canada buy the parts from us. Here at Avianor, we pride ourselves in helping our clients save money.

## **What is the role of Mirabel in the Montreal cluster?**

Currently the terminal is closing down, as the property taxes were too high, and the government did not want to waive them. Mirabel and the airfield are very important for aerospace. It is inexpensive to land, we can store aircraft and our customers can keep aircraft parts. We are next to the cargo terminal and thus have quick access to parts and material. There are significant advantages of being at an airport that has a substantial amount of ramp space and runways. •

# MarieChantal Chassé

President, JMJ Aerospace



*"Regarding our customers that work with production units, such as Safran and Pratt & Whitney, we began to take charge of their internally outsourced teams"*

## JMJ Aerospace works in the field of aerospace human resources. To begin, tell us about the formation of JMJ Aerospace and the services it provides the aerospace industry.

JMJ Aerospace was founded by an associate and me in 1996, its specialization being an outsourcing of human experts & technical assistance service provider for the aerospace industry. JMJ Aerospace's initial service offerings were quite traditional in scope, providing the aerospace industry with outsourcing solutions that include onsite technical assistance, recruitment, team logistics, and personnel management. Through this value-proposition, JMJ Aerospace enjoyed success and, in 1999, we opened an additional office in the United States. Over the years, JMJ Aerospace expanded its customer base and profile of service offerings, continuing its evolution within the sector through today. Overall, JMJ Aerospace's mission is to be an extension of its customers' activity, supporting their human resource needs in any way possible.

## How has JMJ Aerospace evolved since its inception?

An essential influence on JMJ Aerospace's evolution has been my technical background in engineering; a quality that has allowed me to view our aerospace human resources niche under a unique lens. Beginning in the late 1990s I started to study how workers in the aerospace industry were being managed, and much to my amazement, I discovered that the industry's human resource management practices were not as highly systemized as I would love it to be. It became evident that companies tended to work in silos; a propensity that is not conducive to highly cyclical industries, such as aerospace. Stakeholders within the aerospace industry need to be aware that its workers will be moving, and rather than expending effort on stabilizing the workforce, need to accept that it is a cyclical industry, and need to establish a system that is capable of addressing this dynamic. Following this revelation, I proposed solutions to our customers that would change their mindsets. While continuing with JMJ Aerospace's philosophy, we began to offer services that were in sync with the industry's cyclical conditions: building contracts with customers, assigning experts and teams that were in sync with their fluctuations, supervising and providing logistics of mobile teams. Regarding our customers that work with production units, such as Safran and Pratt & Whitney, we began to take charge of their internally outsourced teams. In this sense, both the industry and our services started in the traditional way and now we are evolving together to embrace the new ways of the new economy, the sharing economy.

## Could you please tell us about the Pairing Automation of Resources in Communities (PARC) program that you initiated?

Organizations typically place great emphasis on their engineering, finance, or marketing departments; human resources is often an underappreciated, albeit critical, function of an organization. As an engineer, my mindset is to think proactively and put a system in place where we think collaboratively and are engaged in new ways to leverage human resources. Over the years I have worked with customers on the transformative idea of sharing human resources among the industry. The aerospace industry's workforce has always been divided into two categories: permanent and temporary employees, with nothing in between. This has the unintended consequence of discrediting a large portion of the industry's human capital. If we take synergies from variations in personnel, superimposing the entire industry's pool of human capital, we can mitigate fluctuations within the industry and enhance its stability. Through the years, we have focused on putting human knowledge at the center of the solution. The role of PARC is to create a systematized platform in which the industry can collaborate and synergize its pool of human resources, which has the effect of promoting business predictability. •

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EXPERT OPINION

# PARC: Sharing Resources

## Where Open Collaborations Accelerates Industries Innovation

Co-written by: MarieChantal Chassé Eng., ICD.D – CEO, JMJ Aerospace & President, PARC • Eman Mehrez MBA – Marketing Manager, JMJ Aerospace & Project Manager, PARC • Kimiz Dalkir B.Sc., MBA Ph.D. – Graduate Program Director MIST, School of Information Studies, McGill University • Magdelin Diaz Geronimo – Graduate Student (MLIS), McGill University & Research Assistant, PARC

More and more, people are realizing that individual resources and knowledge are limited, but as a collective whole, there are a plethora of opportunities. Companies have taken notice and some have created business models based on sharing everything from hardware tools, houses, books, and car rides to hosting services, where they share their skills in exchange for other knowledge that they wish to acquire. It seems the sharing economy movement is here to stay, and for good reason. Resource sharing is key in optimizing costs and reshaping unused value.

One company that has taken resource sharing to another level is JMJ Aerospace, an outsourcing and technical assistance company with almost 20 years of service in the aerospace sector. Seeing the need to optimize resource usage, to create a means for continuity of employment for specialized workers during slow economic times, and to improve knowledge transfer in the industrial sector, CEO and entrepreneur MarieChantal Chassé Eng. initiated the project, PARC – Pairing Automation of Resources in Communities. Funded in part by the Quebec government as the 5th Mobilising Project in Quebec, PARC seeks to bring value to different business sectors through establishing sharing communities of different types of resources; human, material and even immaterial. By systemizing and automating the sharing conditions, PARC will create stable access to resources for SMEs and large corporations alike, and at the same time provide a stable work environment for the job force.

“Being an engineer at heart, and leading a company that works in outsourcing resources, I have picked up very quickly the inefficiency that surrounds the current way of handling resources. And after long time of persistence, hard work and conviction, we won the 5th mobilising project and PARC was initiated. We are embarking in a

new economical era. And in order to strive as an industry, as a community, we have to switch from working in separate silos and start embracing the new economy, the sharing economy.” - MarieChantal Chassé. PARC is accomplishing this vision by implementing subprojects geared towards testing a sustainable sharing model. Subprojects that focus on best practices in managing operations of sharing communities, technological platforms, and knowledge sharing. One such project was launched as a research/action project in collaboration with four industrial partners (Bombardier Aerospace, Pratt & Whitney Canada, Bell Helicopter Textron & JMJ Aerospace), four research partners (McGill, Polytechnique, ÉTS & HEC) with the support of AeroMontreal & CRIAQ. This project aims to field test the operations of a collaborative virtual lab to share research equipment and expertise in order to test potential governance and financial models that could enrich the PARC sharing framework. The collaboration between these organizations is in itself an example of how resource sharing can benefit organizations and business initiatives overall. The organization of partners pooling together financial resources, expertise, research capacity, and human resources ensures the efficient and effective use of collective resources.

“We would like to globally interconnect the Aerospace communities forming a network of knowledge that innovates and creates new products. This collaboration between industries and universities will help to connect people while bridging silos allowing us to share our best practices.” - Marco Beaulieu, Head of Knowledge Management practice, Product Development Engineering, Bombardier.

This successful synchronisation between the university and industry allows the community to accelerate innovation. Working closely together, the collaborating partners

were able to overcome a lot of issues that are to be expected while dealing with differing institutional motivations such as the struggles surrounding intellectual property, balancing knowledge sharing and competitive advantage, among others.

“This project has the potential to trigger a paradigm shift in the way academics interact between each other and collaborate. The current model “1 professor = 1 independent SME” could bloom into a collective of collaborating academics. This evolution will not only optimize the costs for operating and maintaining infrastructure, but will also create real synergies between academics and industrial, thus increasing our national competitiveness”. - Prof Martin Lévesque, Canada Research Chair in Multi-scale Modelling of Advanced Aerospace Materials, Polytechnique Montreal.

What has made this success possible? Partners adjudicate success to four inter-related factors: (1) participatory research approach, (2) co-design methodology, (3) proactive role of participants, and (4) the establishment of rules and expectations based on trust and transparency.

“Collaboration is often approached using a “build it and they will come” mentality. The so-called soft factors of trust, reciprocity and shared understanding of goals are often neglected and yet they will make or break the project” - Prof. Kimiz Dalkir.

Where each partner individually would have to invest substantial efforts to advance the project, as a community, each partner can participate as per the availability of their resources and still maximize the collective benefits of the project.

“I heard an African proverb once that says “If You Want To Go Fast, Go Alone. If You Want To Go Far, Go Together”. What a true quote, Quebec is already leading the industry, imagine where we would be if we effectively and efficiently work together.” - MarieChantal Chassé. •



*"With the most comprehensive product portfolio in the industry and our commitment to leadership in customer satisfaction, coupled with our solid product development roadmap, Bombardier is well-positioned to benefit from the next business aircraft market upturn."*

*- Alain Bellemare, President and CEO,  
Bombardier Inc.*

*The CRJ regional aircraft family, the most successful program in history.  
Photo courtesy of Bombardier Inc.*

# Future Outlook

## *Staking Quebec's claim in the Global Aerospace Community*

With the rise of new emerging hubs internationally, it is imperative for Quebec's aerospace cluster to sharpen its competitive edge and adapt to changing market conditions in order to remain at the forefront of the global aerospace industry.

Quebec's four prime contractors – Bombardier, Bell Helicopter, P&WC, and CAE – have consolidated their networks of suppliers in preference for robust integrators that can function as risk-sharing partners. This transition is reshaping Quebec's entire aerospace supply chain. Integrators are tasked with managing an increasing number of sub-tier suppliers in order to deliver end products. While integrators are encouraged to solidify their supply chains, sub-tier suppliers are spurred to vertically integrate and refine their own manufacturing processes. As Alain Bellemare, president and chief executive officer of Bombardier comments: "...local players should continue to focus on quality, productivity and cost-competitiveness. This can be done through investments in automation to develop their capacity to manufacture more complex products or the implementation of Lean techniques to reduce waste." From the Big Four to local small and medium-sized enterprises

(SMEs), a ripple effect is taking place down the supply chain in which stakeholders are unifying their efforts to advance manufacturing processes.

Quebec's aerospace industry has a rich heritage and scope of competencies to innovate and adapt to changing market conditions, and the Big Four harness robust R&D programs to develop cutting edge technologies. Amid rising fuel efficiency and environmental concerns, P&WC is now incorporates composites and advanced alloys into its engines, and directs its R&D towards the reduction of fuel-consumption, noise, and emission levels.

Quebec's OEMs can further enhance their research capabilities by partnering with local research institutions, universities and SMEs. A great example of collaboration is the Greener Aircraft Catalyst initiative (SA<sup>2</sup>GE). This partnership seeks to develop pre-competitive technologies for the next generation aircraft and combines C\$70 million of investment from the Government of Québec with C\$80 million from industry players, including OEMs and over 20 SMEs. Collaborative initiatives will be crucial for Quebec going forward. As Quebec's aerospace cluster strives for

continual advancements, the government is creating an environment conducive to the industry's growth. In addition to its specialized training establishments and state-of-the-art research centers, the government offers financial incentives for private investment projects through R&D tax credits, as well as a tax holiday for major capital ventures. In 2014, the government announced a C\$300-million repayable contribution to P&WC under the Strategic Aerospace and Defence Initiative (SADI) program and also announced \$1.38 million in repayable funding for two aerospace companies based in Quebec, Avior Integrated Products and Techniprodec, to help improve productivity. Through federal support, the Consortium for Aerospace Research and Innovation in Canada (CARIC) was created in 2014 on the same model as Quebec's CRIAQ. CARIC is aligning its efforts to provide a powerful platform for Canada to multiply its innovative capacity through inter-provincial collaboration.

As the success of Quebec's aerospace cluster is enabled by its internal consolidation, integration and continued process improvements, local players can also take steps to broaden their presence outside of Quebec, by mobilizing and leveraging the attributes of the cluster's resources. Hon. Jacques Daoust, Minister of Economy, Innovation and Exports posited: "Through the expertise, the determination and the ability to innovate of the cluster's more than 200 companies, Quebec is reaffirming its strength as one of the largest aerospace centers in the world." •

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**Kerif Fisher,**  
Vice President/General Manager  
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