GLOBAL BUSINESS REPORTS

INDUSTRY EXPLORATIONS

QUÉBEC AEROSPACE

2015

Aerospace - Original Equipment Manufacturers - Aerostructures - Engines
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AUTOMATATION

Revolutionizing Aerospace

As aircraft manufacturers across the world continue to experience strong order backlogs, a message is being sent down the supply chain: suppliers need to expand their production capacities and improve their manufacturing efficiencies in order to satisfy growing demand. Competitive pressures from abroad are also encouraging Quebec suppliers to optimize their operations. Automation can help level the playing field by reducing disparities in labor costs and improving throughput, and many opportunities exist both locally and internationally for suppliers seeking to automate their manufacturing processes.

From 2010 to 2014, Bombardier's backlog of aircraft orders grew at an annual rate of nearly 24%, reaching a valuation of $36.6 billion in 2014. In order to address this growing industry trend, suppliers must be at the leading edge of modern technology to accommodate their customers' needs with efficiency. "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," said president and chief executive officer of Bombardier, Alain Bellemare.

In Quebec, suppliers have started implementing Lean manufacturing practices under the guidance of programs such as Aéro Montréal's MACH initiative. The industry's suppliers are taking

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- Chahe Bakmazjian, President, Robotmaster (Jabez Technologies)

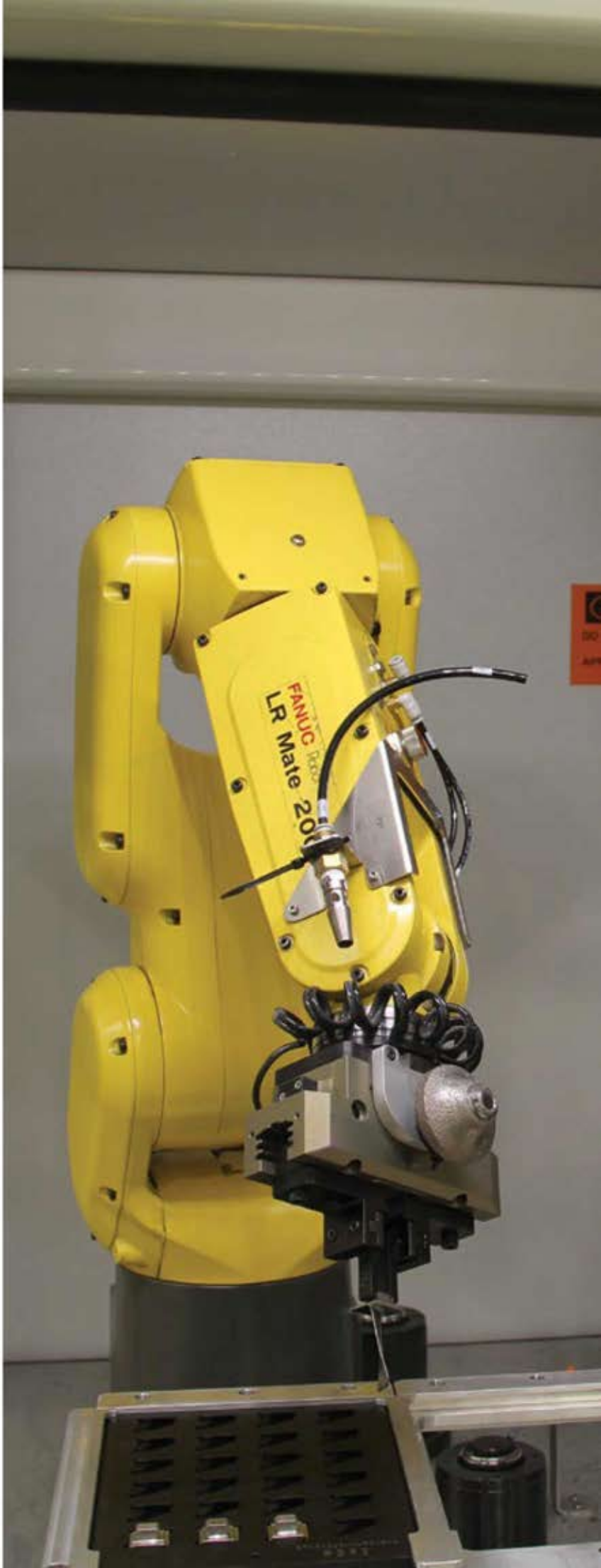

Image: General Electric Bromont

advantage of local resources and incorporating automation into their processes, benefitting from locally developed robotic and software technologies.

General Electric Aviation's facility in Bromont, Quebec exemplifies the benefits of being on the cutting edge of sophisticated automation. Since the late 1990s, GE Aviation has integrated over 120 robots into its production line, and consequently become one of the most automated aerospace production sites in the world. In July 2013, GE Aviation established its Global Automation R&D Center in Bromont to develop advanced robotics, software, and intellectual property for GE Aviation's operations worldwide. The outcome of GE's automation initiative has "(…) proven highly effective in enhancing the quality and productivity of [their] operations. Consequently, [they] have enjoyed sustained productivity increases in excess of 7% annually," said director of Robotization at GE Bromont, Alain Ouellette.

GE Aviation's automation has been facilitated by AV&R, a Montreal-based robotics supplier. AV&R specializes in general automation for vision and robotics, and has supplied many of the robots that are used in GE's Bromont facility today. Based on its success with GE, AV&R is developing relationships in Canada and internationally. Commenting on future projects, CEO of AV&R Jean-Francois Dupont, said, "we are going to be part of the supply chain for Pratt & Whitney U.S. that has built an automated production line that has no human intervention."

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- Jean-Francois Dupont,
CEO,
AV&R

While Quebec is known for its engineering expertise, it is also becoming increasingly involved in developing innovative software to support automation. "The demand for robotics is increasing, and pressure is building for companies to turn towards automation," said Chahe Bakmazjian, president of Robotmaster (Jabez Technologies). In response, the software Robotmaster supports most industrial robot models to promote efficiencies in the aerospace manufacturing processes. ICAM Technologies, a local software programming company with nearly 45 years of history, develops software that bridges the gap between CAD/CAM machines and robots. Despite its international reach, over 90% of its solutions are exported. All of ICAM's software development is conducted in the province. Quebec's aerospace cluster is not only at the forefront of adopting leading technologies, but creating them as well. •

Jean-François Dupont

CEO
AV&R

Please provide us with a brief overview of AV&R and its regional presence.

The roots of AV&R date back to 1994, when the company was initially a product of Walsh Automation. In 2006, AV&R Vision & Robotics was born, specializing in general automation for vision and robotics targeted towards multinational companies. Our research and development (R&D) team produced new solutions for body finishing and surface inspection, and AV&R's goal was to be recognized as the best in this field for the aerospace industry. We have achieved our goal and used our excellent reputation with original equipment manufacturers (OEMs) to move into other market segments. We currently have systems deployed in Singapore, Israel, Italy, France, Germany, United Kingdom, Turkey, Mexico, United States, and Canada. Within the aerospace industry, we follow OEMs through the supply chain.

What markets does AV&R actively target with its products?

AV&R is primarily focused on the aerospace market, but has identified the need to diversify its revenue stream in order to avoid the adverse effects of singular business cycles. Accordingly, we have entered the energy sector using our expertise in gas turbines, such as blades. Our technology can also be applied to maintenance, repair and overhaul (MRO) markets, which contribute 20% to 25% of our total work volume. Our strategy has been to keep up with our core competencies, albeit our clients always request new technology and innovations for their automation projects.

AV&R recently merged with IMAC Automation. In what ways has this merger expanded the portfolio of automation solutions that you are able to offer the aerospace industry?

The IMAC merger equips AV&R with the following: greater stability and more industrial space in Quebec, increased revenue affording a stronger position for making acquisitions in the United States or opening a new office in Europe, and IMAC's expertise in automation complementing that of AV&R's solutions. We now have new expertise in the form of robotic painting that has become very popular in the aerospace sector. This expertise will supersede manual applications, such as erosion coating on fan blades and painting of landing gears.

As a case study, what have been some of AV&R's largest projects and greatest achievements?

AV&R supplied a large number of the 140 robots used at GE Aviation's production plant in Bromont, Quebec, which is the most automated aerospace production site in the world. Three years ago, we started a partnership with GE Aviation to share our technology, and for AV&R to access their production to accelerate the development of its solutions. We also share our automation technology with Rolls Royce and Pratt & Whitney.

Automation revolutionized the automotive industry in the late 1970s and 1980s. In what ways can automation have a transformative impact on the aerospace industry?

The aerospace industry requires more intelligent automation than that of the automotive industry since its precision needs are greater. Fuel consumption for commercial aircraft represents a tremendous expense to airlines. This reality has pushed the engine manufacturers to increase fuel efficiency. To do so, they improved aerodynamics on jet engine blades & vanes by using tighter tolerances and more complex elliptical 3D profile. Tolerances on newer engines are around ± 0.0015 in (37 µm) and are planned to go to ± 0.001 in (25 µm). With these new requirements, manual profiling is no longer sustainable. Aspects such as labour cost reduction, difficulty to find skilled operator and to eliminate injury have also push to automate this operation. On the repair side, in addition of fuel saving, better aerodynamic leads also to less scrap and longer blade life.

This transformation on the aerospace industry has slowly started but is likely to get very intense as the new engines are being manufactured. AV&R is ready and eager to get on board!

les affaires

Industrie aérospatiale

A4

Les fournisseurs doivent en faire plus

Ils doivent participer davantage à l'effort de R-D et fournir des parties complètes d'avion.

Présence en force de Bombardier au Bourget

L'avionneur québécois profite du Salon de Paris – Le Bourget, en France, pour promouvoir les appareils de sa nouvelle gamme CSeries. Objectif : séduire des clients, garnir son carnet de commandes et trouver un nouvel élan pour ses avions d'affaires dans un marché ultraconcurrentiel.

les affaires

Industries aérospatiale

AV&R est victime de la réglementation américaine

Simon Lord, *redactionlesaffaires@tc.tc*

«C'est une façon de faire du protectionnisme.» Jean-François Dupont, PDG d'AV&R

AV&R fournit aux entreprises des technologies robotisées pour effectuer la finition, l'inspection ainsi que la peinture de pièces, principalement des composants de moteurs d'avions. Mais pour procurer les bons outils à ses clients, l'entreprise montréalaise doit d'abord voir ces pièces, ou au moins leurs plans, et cette étape s'accompagne d'une lourde paperasse pour les clients américains. Cela incite nombre d'entre eux à préférer faire affaire avec un fournisseur américains, même à prix supérieur, souligne Jean-François Dupont, PDG d'AV&R.

«C'est une façon de faire du protectionnisme. L'argument est la sécurité nationale. Mais parfois, ça va tellement loin qu'on s'aperçoit que c'est pour protéger le marché. Il est à peu près aussi difficile d'obtenir un contrat pour une pièce commerciale des États-Unis que pour une pièce militaire d'Italie», explique-t-il.

Le problème : les International Traffic in Arms Regulation en vigueur aux États-Unis exigent en pratique que les pièces ou informations d'une entreprise américaine relatives à des technologies de la défense ne soient partagées qu'avec des citoyens américains. Et cette autorisation demande de remplir de volumineux formulaires.

La direction d'AV&R estime que cela ralenti son développement en aérospatiale aux États-Unis, un marché qui représente déjà 30 à 35 % de ses ventes annuelles.

Si AV&R réussit actuellement à tirer son épingle du jeu au sud de la frontière, c'est qu'elle se trouve dans une niche de technologie avancée où elle et ses 105 employés sont souvent les seuls à pouvoir fournir certaines solutions. Mais ces projets sont des mandats complexes qui exigent habituellement beaucoup de recherche.

Lorsqu'il s'agit de projets plus simples, et plus nombreux, l'entreprise ne reçoit plus des appels d'offres de clients américains potentiels. «On pourrait vendre notre solution à grand volume. C'est là où se retrouvent les meilleures marges bénéficiaires. Mais c'est tellement compliqué pour les clients qu'ils ne feront pas les démarches», admet-il.

Une solution : les partenariats

La meilleure chose à faire, c'est de s'adapter, juge Mehran Ebrahimi, directeur du Groupe d'étude en management des entreprises de l'aéronautique à l'université du Québec à Montréal. «Le monde est incertain. De telles mesures se justifient et sont là pour rester. Au final, c'est comme le défi des fluctuations du dollar. Il faut accepter la situation et s'adapter», dit-il.

AV&R a actuellement un partenaire américain, avec lequel il collabore et échange des projets. Lorsqu'on fait appel à ce partenaire pour un projet canadien, c'est AV&R qui le réalise, et vice-versa.

L'entreprise montréalaise réfléchit aussi à l'ouverture d'un bureau aux États-Unis. Mais cela ne règlera pas entièrement le problème, parce que seules les personnes ayant un passeport américain pourraient obtenir l'autorisation de voir les pièces sur lesquelles les machines d'AV&R devraient travailler, explique M. Dupont. «Pour nous, à Montréal, ce sera difficile de considérer un projet potentiel et le risque qu'il représente.»

Plus généralement, les exigences encadrant les exportations constituent souvent un défi dans le commerce transfrontalier en aérospatiale, en raison notamment de la nature très complexe des produits et services dans ce domaine.

«Il y a toujours du travail à faire pour atténuer les barrières commerciales», reconnaît Jim Quick, président de l'Association des industries aérospatiales du Canada.

D'autres lacunes

La réglementation n'est pas le seul défi du développement du marché américain. Le marketing en est un autre, selon Isabelle Dostaler, professeure à l'École de gestion John-Molson de l'Université Concordia. «Nos entreprises sont innovantes, affirme-t-elle. Mais l'effort en matière de développement des affaires et de mise en marché n'est pas toujours là. C'est vrai pour le marché américain, mais aussi pour les autres marchés du monde.» Dans plusieurs entreprises, on note une absence de culture de R-D, remarque M. Ebrahimi. Souvent, les PME, n'ont simplement pas les moyens adéquats pour faire de la R-D.

«Le savoir-faire de plusieurs de nos entreprises s'organise donc autour de ce qu'elles savent faire pour un seul client ou un groupe restreint de clients», dit-il.

Par conséquent, peu d'entreprises ont la capacité de devenir des intégrateurs, c'est-à-dire des entreprises qui assemblent des pièces de bases pour en faire des composants intermédiaires, plus finis, comme un frein ou un siège. Elles n'ont donc pas la possibilité de faire le saut à l'extérieur du Québec.

Il s'agit d'un défi important en matière d'exportation, surtout dans un contexte où les constructeurs d'avions cherchent de plus en plus, depuis 10 ans, à faire affaire avec intégrateurs.

www.avr-aerospace.com / Headquarters: Montreal / **Employees:** 120 / **Specialty:** Aerospace automation / **Jean-François Dupont, CEO:** *"Innovation is part of our DNA."*

INTERNATIONAL

AV&R AEROSPACE OFFERS AUTOMATION INTEGRATION SERVICES WITH TOOLS SUCH AS ITS ROBOTIC BLADE PROFILING SYSTEM.

'Critical Parts'

AV&R IS SELLING CUSTOM AUTOMATED SYSTEMS TO THE GLOBAL AEROSPACE INDUSTRY. BY RUSS GAGER

Little things like tiny imperfections on the surface of critical jet engine parts can affect the engine's efficiency in a big way. Similarly, concentrating on a small portion of a very important and expensive market can result in big growth. That is the strategy that AV&R Aerospace has adopted.

"What we do is provide robotic solutions for part finishing, surface inspection and painting," CEO Jean-François Dupont explains. "We focus our effort on the critical parts inside the jet engine. We decided in 2008 to focus our energy in that particular market. It's not a big market, actually, but the goal of the company was to be recognized as the leader in that area and to use that recognition to explore other market segments. We succeeded pretty well, so now the company is well-known inside of the OEMs. On top of that, we have established R&D partnerships with Rolls-Royce, Pratt & Whitney and GE Aviation."

AV&R Aerospace designs and contracts for the manufacturing of automated machines that finish the jet engine parts. A popular product is a system that creates the profiles on the jet turbine's blades.

"The requirements now for the performance of the new engines requires an extremely accurate profile on these blades," Dupont points out. "It's not possible to do it manually, so you have to use robots. That is extremely popular right now. The size of our system – you could compare it to a refrigerator. It's not that big, but there's a huge portion of software in our systems. Basically, it's a small system using robot cameras and lasers to give feedback. It's just a simple system when you look at it that we improved over the years. The size will vary depending on the type of application."

AV&R Aerospace has 80 engineers on staff. "We do all the concepts," Dupont says. "We send out to our two different workshops the fabrication of the equipment, and we do the integration in our workshop and the final testing." After customer trial and approval, the machines are shipped to the customer.

Onsite Commissioning

Commissioning the equipment at the customer's site can take from two weeks to two months. "Two months is a big startup for us," Dupont maintains. "Usually, two weeks is enough. On some of the machines, we just have to plug in the cord and that's it. Other systems are shipped in different containers or trucks and we do the assembly onsite, but most of the time, we don't have a lot of things to do onsite, which is good, because we work actually in 12 different countries. So we don't want to send a complete team to our customers' sites. It is very expensive for us. Most of the time, only one engineer is enough to start the system."

Among those 12 countries are the United States, Canada, Mexico, the United Kingdom, Germany, Italy, France, Singapore, China and Russia. Dupont estimates that approximately 30 percent of AV&R Aerospace's revenue is from Europe, up to 35 percent from the United States and Canada,

and the rest from Asia. Approximately 70 percent of the company's revenue is from the aerospace market and up to 10 percent from the energy industry. "A natural-gas-fired generator is essentially a jet engine on the ground," Dupont points out.

The rest of AV&R Aerospace's revenue is derived from the general automation industry. "In our local integration market, we find something that we could replicate, and it will become a market segment for us," Dupont explains. "We will invest more and more to become a leader in that area."

Future Growth

AV&R Aerospace has two locations in Montreal. It plans to establish regional offices internationally in the near future.

The company has doubled in size since last year, and Dupont is expecting that growth to continue in upcoming years. "We're excited with what's coming on for 2016, 2017 and 2018," he declares. "They are going to be big years for us, and we expect a lot of volume in our manufacturing cells. The average age of our employees is 32 years old, so it's a very exciting culture, and our employees like to be challenged. We appreciate their work. Innovation is part of our DNA. We put a lot of money into R&D every year so we come with new solutions. We are playing with robots, cameras, computers – it's pretty cool."

Dupont attributes the company's success to its specialization. "In the past, we were generalists," he explains. "We were doing every automation project that required a robotic vision system. We decided to narrow our expertise, and we succeeded.

"We have a mandate to diversify our market," Dupont adds. "We're looking to deploy our technology in the orthopedic industry. We are doing some trials on knee, shoulder and hip replacement parts for the human body that require surface polishing and inspection, the same kind of technology as jet turbine blades but in a different market." **mt**

Proax Technologies Ltd. For over 50 years, Proax Technologies Ltd. has been a leading Technical Automation Distributor, offering innovative product solutions for machine automation, motion control and machine safety needs. Proax is proud to partner with AV&R providing innovative product solutions, and in-house local technical support. Proax has 10 locations across Canada and represents world-class leading manufacturers in the automation industry. Please contact Proax for your industrial automation needs! 1-800-557-7386

ROBOTICS TOMORROW

July 27, 2015

Robotmaster featured in Global Business Report editorial, Automation: Revolutionizing Aerospace

President, Chahe Bakmazjian, discusses the emergence of robots and how Robotmaster enables manufacturers within the aerospace industry seeking to automate their manufacturing processes.

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About Global Business Reports

Headquartered in Singapore and with offices in Istanbul, Global Business Reports (GBR) was established in 2001 in order to provide up to date and first hand information for global business decision makers. The company employs a team of multilingual business journalists, researchers as well as marketing and communication professionals who allow us to provide the most comprehensive, in depth sectorial coverage to our partners and clients from the furthest corners of the globe.

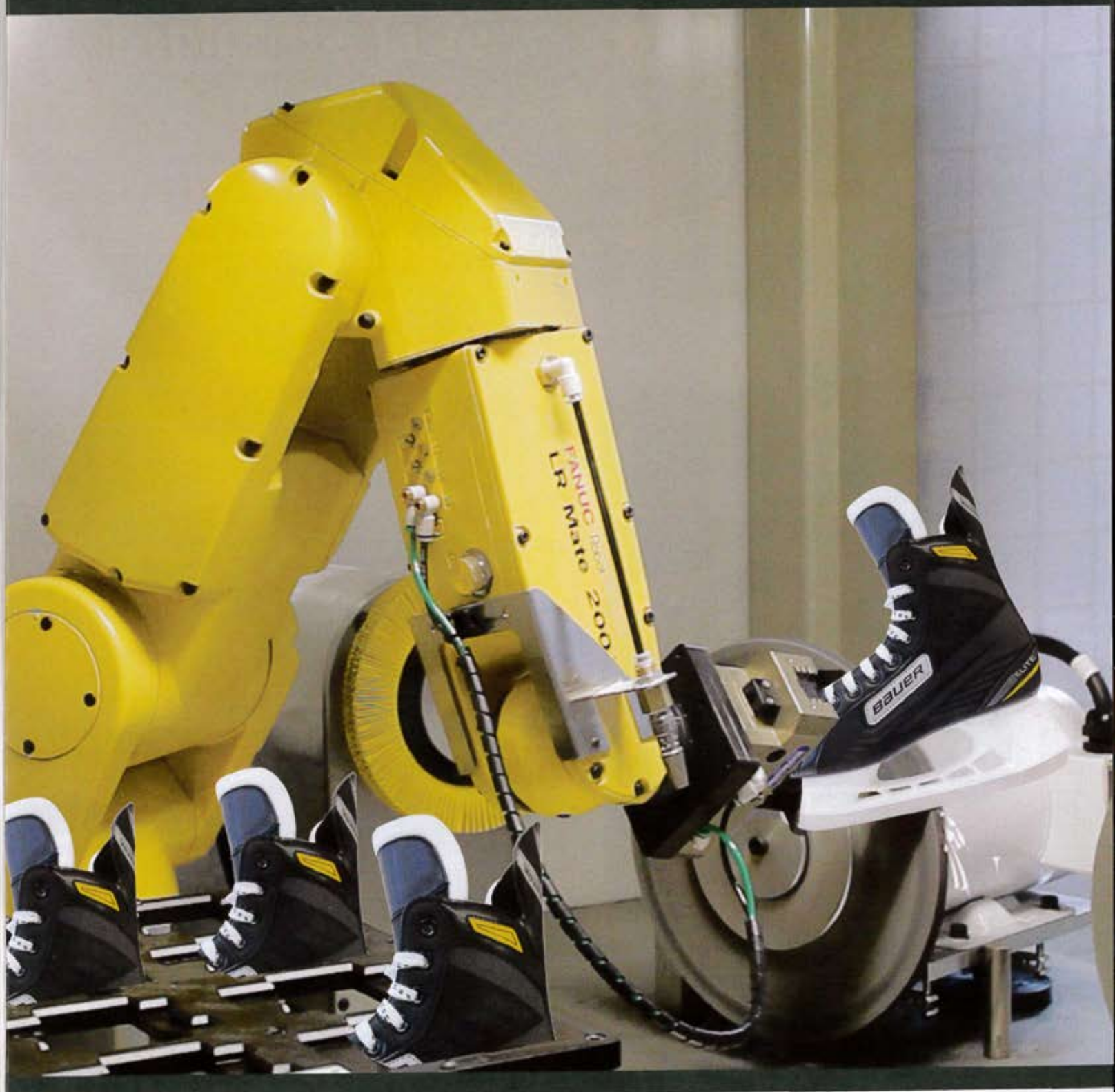
About Robotmaster

Robotmaster seamlessly integrates CAD/CAM based robot programming, simulation and program generation. Common robot programming challenges typically require intricate user intervention or costly manual editing for producing error-free programs. Robotmaster provides innovative tools to effortlessly optimize robot programs producing error-free robot paths, avoiding singularity zones and collisions, working around joint and reach limitations, and optimizing tool orientations along the entire trajectory. Furthermore, Robotmaster is ideally suited to program robots for such tasks as trimming, de-burring, polishing, welding, dispensing, grinding, spraying, painting and 3D machining, while supporting most industrial robot models.

About Jabez Technologies

Jabez Technologies provides robot programming technologies that enable versatile and profitable robotic solutions for industrial manufacturing applications. Robotmaster is the flagship product of Jabez Technologies, specializing in robot programming technologies for robotics automation and manufacturing since 1996.

AV&R



www.avr-global.com

AV&R

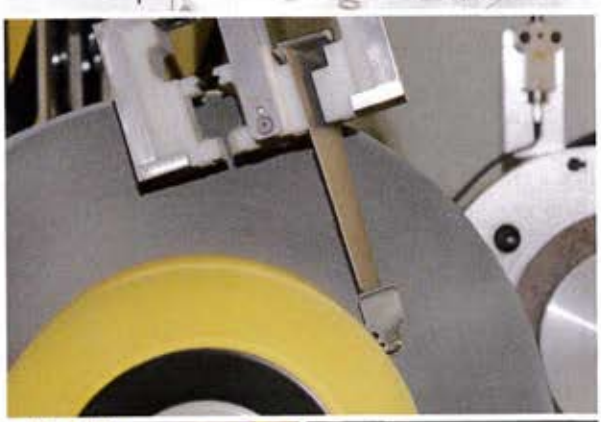
LA PLUS IMPORTANTE FIRME SPÉCIALISÉE EN ROBOTIQUE DANS LE DOMAINE DE L'AÉROSPATIAL AU MONDE

AV&R est une société d'ingénierie spécialisée en automatisation qui compte plus de 120 employés œuvrant à travers le monde. Elle offre des solutions d'automatisation, de vision artificielle (vision numérique) et de robotique.

Les secteurs d'activités majoritaires d'AV&R sont l'aérospatial et la défense, l'énergie, l'automobile, le secteur minier, manufacturier et les dispositifs médicaux.

AV&R se distingue à travers son approche novatrice, son expertise en ingénierie et en conception de systèmes automatisés clés en main. L'entreprise demeure en tête de course en investissant massivement en recherche et développement afin d'offrir les meilleures solutions possibles à ses clients. Les produits créés par AV&R sont basés sur les idées des membres de son équipe, l'écoute et la compréhension des besoins exprimés par ses clients.

S'adaptant parfaitement au rythme des environnements de fabrication d'aujourd'hui, les systèmes d'AV&R renforcent l'autonomie du personnel en usine et permettent la réalisation automatisée des opérations à une vitesse optimale. En outre, ses solutions, fondées sur une technologie éprouvée et sur des années de compétence, augmentent le rendement en usine tout en réduisant les cycles de livraison et en optimisant le retour sur investissement (ROI).



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Pierre Langlois	Gest. IT
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