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# Shop

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# Reaping Robotics Rewards

A Quebec manufacturer's embrace of robotics pays off

When Laurent Gravel, president of Group Gravel, Mariville, QC, took a step back to examine his manufacturing business and how best to position it for future success, he created a new vision: create an integrated, turnkey manufacturing operation from design to build.

It was an ambitious plan because Groupe Gravel's manufacturing operation was unique, consisting of a full service CNC machining operation and sheet metal fabricating and welding operations. In the 1990s, he implemented offline programming for the CNC machining shop's milling and turning centres. Then in 2013, he turned his focus on the company's plasma cutting and welding operations.

"We had experience working in CNC and we wanted to bring CNC-like capabilities to cutting and welding of batch sizes of one-off parts. We were looking for precision and quality to get it right the first time with a minimum number of operations and handling. That meant speed, accuracy, and programming as well as improvements in production," explains Gravel.

The solution was a robotic workcell for plasma cutting and welding. It took Group Gravel two years to get the cell up and running with the help of AGT, a Quebec based robotics integrator and



The robotic workcell for plasma cutting and welding combined with Robotmaster's robotic programming system has helped to increase production efficiencies at Groupe Gravel's operation in Mariville, QC.



Robotmaster, part of Hyptherm's robotic software team. The cell consists of a Fanuc M-710 iC/20L long-arm robot with a 3 m (10 ft) reach. The robot was integrated with an ESAB ESP-150 Plasmarc plasma cutting system and a Lincoln Electric Power Wave 455M robotic arc welding package. Shortly after the installation, Group Gravel added a two axis positioner with a half ton payload for welding and cutting of tubular parts.



### ESTABLISHED ROOTS

Jacques Gravel, Laurent's father, formed the business in 1974 as Jacques Gravel Inc. Through the years the company witnessed steady growth and transitioned into the multi-faceted manufacturing operation that exists today.

It has grown from a 1,000 sq ft facility to a 20,000 sq ft one and employs 30 people. The company offers in-house design engineering, reverse engineering, machining, welding, cutting, millwright work, quality testing and inspection. The shop focuses on small runs, from one-offs to lots of a maximum of ten.

### NO ROBOTICS EXPERIENCE, NO PROBLEM

Some manufacturers regard robots and robotic systems with trepidation, especially if they're unfamiliar with the technology. Not so for Groupe Gravel. The transition to robotic cutting and welding and associated programming was an easy one, thanks in large part to Robotmaster's CAD/CAM software, says Gravel.



The robotic workcell for plasma cutting and welding. The company is considering adding another robot dedicated to 3D plasma cutting and is also looking into flexible robot fixturing for its robotic welding cell.

"Robotmaster's understanding our process was crucial. Without Robotmaster, we simply couldn't have done it."

Indeed, within five days of training with Robotmaster staff, Laurent Gravel and his staff were programming their robot. The Robotmaster offline programming software enables quick path creation from a CAD model and sets optimal tool orientations for cutting and welding automatically. An important element of the software that Gravel points out is RISE—the Robotmaster Interactive Simulation Environment.

## Demystifying Robotic Programming for SMEs

If North America's small and medium sized manufacturers want to remain competitive, they must invest in advanced manufacturing technologies. One of those technologies is robotics and Montreal-based Hypertherm Robotic Software Inc. is helping to ease the transition into robotics with its CAD/CAM-based offline robotic programming system, Robotmaster.



"What makes Robotmaster unique is the speed at which users with little programming knowledge can create offline programs for robots," explains

Garen Cakmak, engineering and sales leader with Hypertherm Robotic Software. "Unlike traditional offline programming, our approach is CAD/CAM based, which allows users to create programs for high/mix low volume runs and to do it faster than traditional offline programming. Our system takes away the programming barrier and allows smaller shops to adopt robotics."

The software program integrates offline programming, simulation and code generation to create error-free programs. It allows users to create accurate robot trajectories without teaching points and uses a "click and drag" interactive simulation and editing environment, known as RISE (Robotmaster Interactive Simulation Environment).

Garen says the Robotmaster software system consists of multiple tools that are "continually being improved based on market needs and customer feedback. For instance, at Groupe Gravel, the company acquired more automated welding tools so we worked on changes in the software such as how to create the weld in an automated environment and touch sensing."

The company is already working on the next release of Robotmaster, which it plans to debut at FABTECH 2016 in Las Vegas, NV.

"We're working on a new platform to accommodate not just SMEs, but larger companies as well and we're developing it with Industry 4.0 in mind, so we're tailoring it for the factories of the future. It's the next level of simplification that will continue to help demystify robotics and make the process easier to adopt for the next generation of users."



Robotic welding isn't as complex as Groupe Gravel had first imagined. With the help of suppliers, including robotics integrator AGT and Robotmaster, employees moved up the learning curve quickly, says company president Laurent Gravel.

The function allows users to modify the robot's positions and trajectories, manually or automatically using a mouse. A key element is the ability to customize the programming of complex arc welding parameters. At Groupe Gravel's facility, screens provide customization of the weld start and end commands, for selection of the welding schedule number, and for controlling weaving and seam tracking.

When Group Gravel added the two axis rotary positioner six months after installation of the robotic workcell, the Robotmaster rotary axis management tools enabled the company to program in either fixed indexing mode or in simultaneous seven and eight axis motion. The tools also aided in the integration of the robot and the rotary axis control to optimize the process.

Gravel says the company has increased production efficiencies—it reduced programming time from six hours to 90 minutes for some parts—and he credits Robotmaster and its team with helping his company and his employees ease into robotic automation.

"So we didn't have any robotic experience...we couldn't have moved up the learning curve to where we are today so quickly without Robotmaster and the help of their team. Eighty per cent of our industries are small businesses like ourselves. Like us, they don't have the technical capabilities needed to use conventional robot automation. Robotmaster is the only way a shop like ours wins."

Groupe Gravel is looking at further expansion, says Gravel. It's considering the purchase of another robot dedicated to 3D plasma cutting and is looking into flexible robot fixturing for its robotic welding cell. SMT



*Written by Mary Scianna with supporting information from Robotmaster, part of Hypertherm's Robotic Software Team*  
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