

## Manufacturer Reduces Outsourcing, Increases Production, Profitability

**Quebec company reduces programming time from six hours to 90 minutes**

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Adding a robotic system enabled Groupe Gravel to reduce programming time while improving production rates.



Groupe Gravel's robot workcell performs plasma cutting and welding on large workpieces at the company's Quebec facility.

### Situation

Groupe Gravel, a family-run machining and fabrication business, based in Quebec offers one-stop service for custom production and repair services. The company has been growing rapidly for the past five years.

The company was delivering on President Laurent Gravel's vision of an integrated, turnkey service by creating parts through in-house design, engineering, and reverse engineering. Production includes welding, cutting, and machining, along with full testing and quality control before parts are shipped for offsite installation and repair.

Groupe Gravel has grown from its original 1,000 sq. ft. to a 20,000-sq.-ft. shop and employs 30 people.

Its customers often need a single, custom part for a single project, typically a replacement, improvement, or repair of an existing part. A production run is most often one unit and rarely more than 10.

Recently Gravel decided that he needed to make his cutting and welding operation as precise and efficient as his CNC machining shop. He had experience working in CNC but was looking to capitalize on capabilities related to cutting and welding for small-batch production.

Both precision and quality were crucial to the shop, and getting it right the first time with a minimum number of operations and handling was extremely important. That meant that speed, accuracy, and programming as well as production were factors which needed to be carefully taken into consideration.

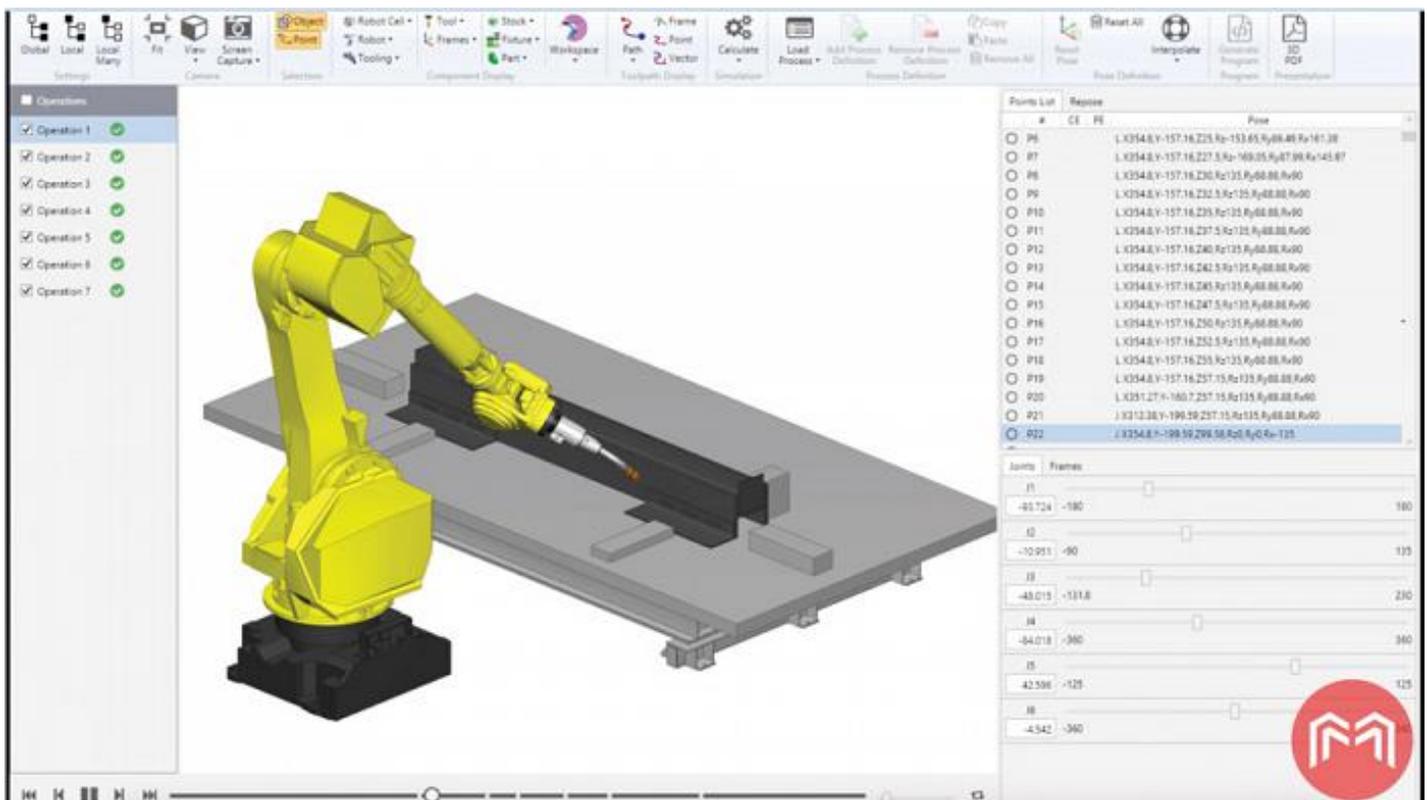
## **Resolution**

Groupe Gravel took two years to install a robot workcell that could perform plasma cutting and welding on large workpieces. With no prior robot experience, Gravel was convinced the robot workcell would provide a faster response time with greater precision and quality in meeting production requirements.

To accommodate arc welding on large workpieces, the company selected a FANUC M-710 iC/20L™ long-arm robot with a 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.

Although the robot was equipped with a long reach, rotary positioners were required to enable cutting and welding for large tubular parts. Six months after the initial robot installation, a 2-axis positioner with a half-ton payload capacity was added.

Robotmaster CAD/CAM software was used to personalize a training program that had Gravel and his team programming the robot after only five days of training. According to the company, the software's tools enabled quick path creation from the CAD model and automatically set optimal tool orientations for cutting or welding.



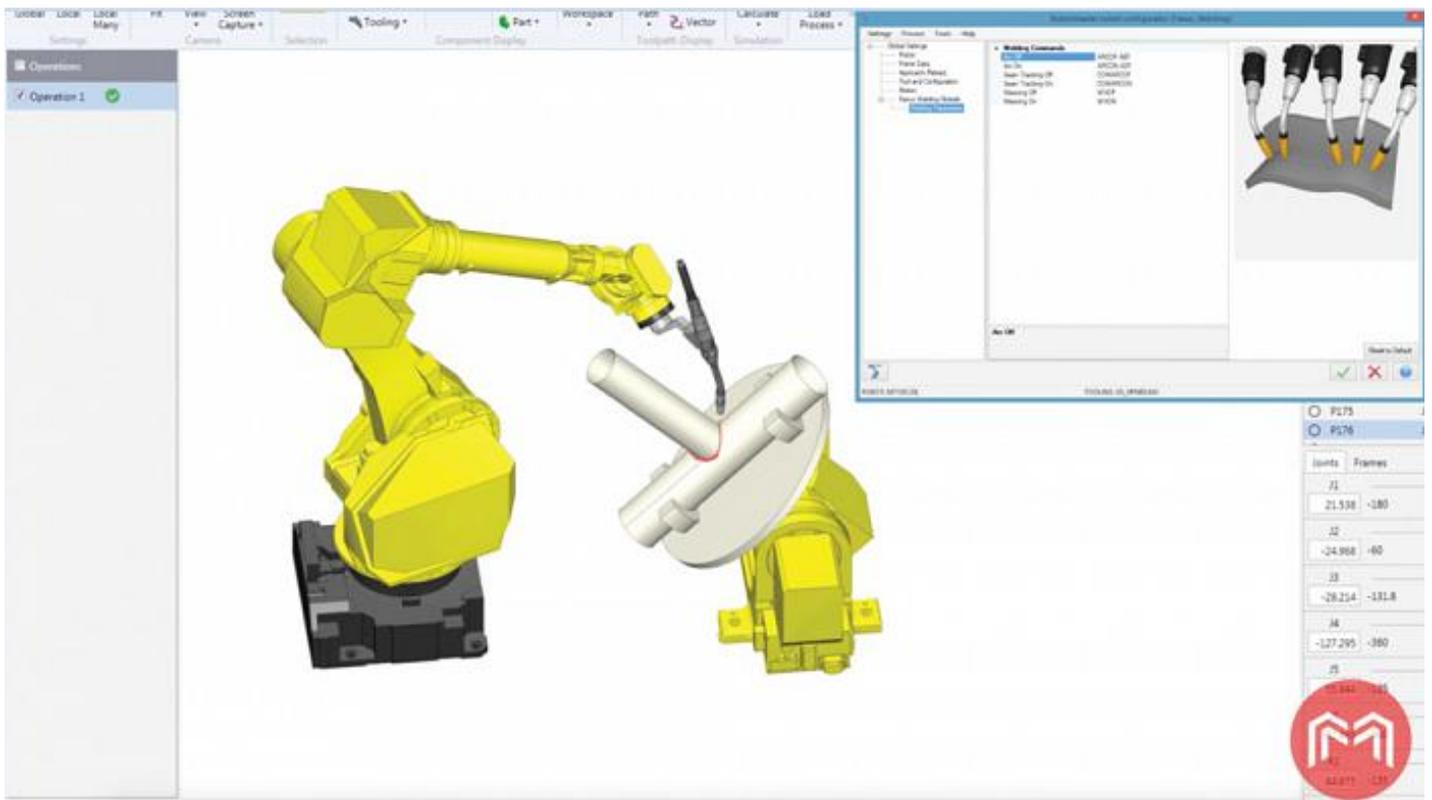
Interactive simulation allows operators to use graphical interfaces to control the path, gun side tilt, push/pull angles, and other path and point-specific settings.

An interactive simulation environment permitted Gravel's plasma cutting experts to have the human touch, supplementing the automation with their technical know-how and acquired expertise. Manual intervention using graphical interfaces allowed for optimized control of the path, gun side tilt, push/pull angles, and other path and point-specific settings.

For Groupe Gravel, the automatic creation of cutting and welding paths and control of gun orientations improved part quality and drastically reduced programming time.

The Robotmaster applications team, the robot integrator, Avant Garde Technologies, and Groupe Gravel worked together to create process streams customized specifically for the programming of complex arc welding parameters. Screens were provided for control of the weld start and end commands, for selection of the welding schedule number, and for controlling weaving and seam tracking.

When Gravel added a 2-axis rotary positioner, coordinating the rotary axis with the robot motion added a new level of complexity to programming. Robotmaster's rotary axis management tools enabled Groupe Gravel to program in either fixed indexing mode or as simultaneous 7- and 8-axis motion and to integrate the robot and rotary axis control for optimized resolution of reach, singularity, collisions, and joint limitations.



The rotary axis management tools enable the robot to perform simultaneous 7- and 8-axis motion for optimized reach.

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