# Latest Technology Enhances Machining of Aluminium Profiles

### Challenge

- To deliver a new, automated robotic solution for aluminium extrusion

### Solutions

- Allen-Bradley® Kinetix® 5500 Servo Drive provided advanced motion control while saving space
- Allen-Bradley CompactLogix™ integrated standard and motion control for the system
- Allen-Bradley PowerFlex® 753 drive reacted quickly for stopping blade rotation

### Results

- The Rockwell Automation Drives and Motion Accelerator toolkit reduced programming time and provided for seamless integration and commissioning
- Multiple networks were supported and configured effectively
- Automated solution provided additional machining reach, a larger envelope, faster idle movements and 3D capabilities for increased productivity and performance

*The robotic CNC system results in improved productivity and performance, increased flexibility, decreased machining time and cost benefits.*

Founded in 2007 and based in Melbourne, Australia, Technical Plant Services (TPS) has serviced various industries, focusing on automation, electrical engineering, safety system design and technical support.

In 2015, TPS was contracted to design and deliver a machining cell solution for a client in the aluminium extrusion industry who required a new long length Computer Numerical Control (CNC) system.

The solution developed encompasses an industry first robotic CNC system that delivers the flexibility to efficiently process small batch orders without compromising on quality.

This system ultimately results in improved productivity and performance, increased flexibility, decreased machining time and cost benefits.

## Robotic Machining of Aluminium Profiles

The added-value department of an aluminium extruder required more flexible access to machine around a profile.

Historically the CNC operator was required to manually machine separate faces and re-align a work piece after repositioning.

After extensive brainstorming, simulation and proof of concept testing, TPS advocated a robotic CNC system as a more cost effective and flexible machining solution.

Successfully designing, engineering and delivering this highly advanced machine required the combined knowledge, expertise and technologies from leading solution providers.

NHP Electrical Engineering (NHP), a Rockwell Automation Authorised Distributor, was commissioned to provide product selection assistance, engineering design and technical support.

TPS's senior system engineer, Daniel Orchard worked with NHP's automation application engineers, David Kenney and Paul Jones to select the appropriate hardware, which offered the integration capability required to meet the application.

This particular project required specialised velocity control and positional requirements, which set the parameters for the brief given to NHP motion experts.

"NHP's calculation software for correct gear ratio, servo and drive specified for us exactly what we needed and the end result is very good," said Orchard.

Based on this, the Allen-Bradley® Kinetix® 5500 Servo Drive with the suitable accessories was implemented to optimize space.

Allen-Bradley CompactLogix™ was specified as an integrating standard and motion controller for the final cut to length saw system, acting as a gateway and supervisory control system for multi peripheral devices; A key feature of this controller is that it offers a common control engine in a development environment for a scalable solution.

*The Rockwell Automation motion control and drives product portfolio provides advanced motion control while optimising space.*

## Seamless Integration

The workpiece geometry is designed within a CAD/CAM software, this is fed directly into the assimilation program to calculate the locations of the handling and cut-off positions.

"The Drives and Motion Accelerator toolkit by Rockwell Automation made it very easy to program the motion components of the system," explained Anatoli Klassen, application engineer – OEM at NHP.

The toolkit uses a modular format that greatly simplifies the work needed from selecting components and developing drawings, to writing code, laying out HMI screens and commissioning. This provided seamless integration and commissioning.

To meet the requirements of the cut off saw, the Allen-Bradley PowerFlex® 753 provided premier integration into the CompactLogix controller.

"For safe entry into the work cell, the blade was required to stop as quickly as possible when requested.

The fact that TPS were using the Allen-Bradley drive, made it easy to select the appropriate breaking resistor," said Klassen.

To assist, NHP engineered a breaking resistor cabinet.

They also helped prototype finger safe enclosures for inside the clamping door area to keep products at the correct IP rating and maintain easy accessibility to pneumatics while restricting access to electrical items.

"Since TPS had experienced the Drives and Motion Accelerator Toolkit in the past and was familiar with our VSD and motion offering, we were able to keep the time required to integrate the saw system to the minimum, providing more time to focus on software development for the CNC part of the application," explained Klassen.

One of the main challenges in a project is the communication and integration of the various products used.

This project was tasked with managing five communication protocols, which were addressed by using protocol converters that were designed specifically by Rockwell Automation or their Encompass Partners.

These protocol converters made it easy to integrate all the required devices to communicate with the central CompactLogix controller.

As demonstrated by the value that these software and productivity toolkits delivered, TPS has joined the Rockwell Automation OEM Program at the Developer Level – an ideal stepping stone for companies looking to take advantage of Rockwell Automation software and competency development tools.

"The OEM program provides the opportunity for participants to benefit from global support, marketing opportunities and solutions and services that align with their business objectives. We help customers lower the total cost to design, develop and deliver machines that meet their endusers' requirements," said Michael Vlahos, OEM sales lead at Rockwell Automation.

*Allen-Bradley CompactLogix integrates standard and motion control for the system.*

## A World First Solution

The advanced technology and engineering of the project not only was an effective solution, but also improved manufacturing flexibility and has the ability to reduce cycle times and cost for the client.

As a result of quality automation and motion control products, alongside solutions and service support, TPS was able to successfully deliver the fully functional and operating robotic CNC machining system to the customer within only 11 months.

"Support for multiple communication protocols and the successful implementation of translation gateways was a big part of this project's success and one of the main reasons we will continue to use NHP in the future," said Orchard.

"It was a mixed bag that unfortunately we could not simplify during our design phase, even though a lot of effort was put in to it.

NHP assisted us through every step providing us with solutions to trial and lots of experience to help us configure some of the more complex devices properly," he continued.

"The automated solution provided additional machining reach, a larger envelope, faster idle movements and 3D machining capabilities. TPS have engineered a very impressive machine and we were proud to be part of it," said Klassen.