Rockwell Automation

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# Revolutionary Liquid Filling Machine Combines Repeatability & Accuracy

### Challenge

- To build and design a new liquid filling machine that would be suitable for a variety of applications requiring repeatability, accuracy and efficiency

### Solutions

- Advanced motion control – Allen-Bradley® CompactLogix™ controllers provided advanced control with a common development environment using Logix5000™ software
- Kinetix® Servo drives were used for precise motion control
- Premier integration – One programming environment with CompactLogix, Kinetix & PowerFlex® drives, PanelView™ Plus and Logix5000

### Results

- Reduced downtime – Time to design, develop and deliver the solution was reduced by using one common programming environment
- Remote connectivity delivers real time data for improved diagnostics
- Accurate filling – Filling is repeatable and accurate within plus or minus one millilitre

**The new Liquid Pack filling machine incorporates industry leading technologies and machine builder know how to meet even the most challenging food or chemical applications**

Liquid Pack has been designing, manufacturing and servicing a wide range of liquid fillers and packaging equipment for over 25 years. Based in Melbourne, Australia, the company services the food and chemical industries. Liquid Pack exceeds customers' requirements by providing custom made, cost effective solutions for every application.

All equipment that Liquid Pack manufacturers are a result of years of learning, accompanied by high quality service and are proudly Australian made. The company continues to invest in cutting edge technologies in engineering and developing innovative solutions for liquid filling applications.

As part of Liquid Pack's commitment to design and manufacture equipment to meet requirements for a wide range of liquid filling applications, the company worked with Rockwell Automation and NHP Electrical Engineering Products (NHP) to design and manufacture a revolutionary new filling machine with uncompromised precision and accuracy.

## Blueprint for an Industry-first Filling Machine

With more than three decades of experience engineering and developing cutting edge technologies for liquid filling applications, Liquid Pack was well credentialed to design a new filling machine that would be suitable for a variety of applications requiring repeatability, accuracy and efficiency.

According to Russell Jones, managing director at Liquid Pack, "We have had a long association with NHP, going back more than 20 years and they have provided excellent service and support. We chose to use a Rockwell Automation solution because it provided seamless communications between all products used in the machine. This was achieved with one single Ethernet network which reduced the overall machine wiring resulting in a reduction in machine build times. At Liquid Pack we are increasing our reliance on Rockwell Automation, recently using their safety services team to perform a machine risk assessment on the filling machine."

The liquid filling machine was designed to fill a range of containers from five to 20 litres. It fills from the bottom to the top of the container to avoid foaming, thereby providing a more accurate measurement. In addition, the machine fills by weight, instead of by volume, which further helps with consistency and reduces wastage.

Once the design phase was complete, the next stage in development was to configure the hardware and software to build the machine to the design specifications.

## Repeatability and Accuracy

According to Rob Campbell, OEM account manager at Rockwell Automation, "The design for this filling machine was carefully planned to give endusers a high level of repeatability and consistency for a variety of applications including food and beverage, chemicals or even petrol and diesel."

The machine leveraged the inherent flexibility provided by the Allen-Bradley® mid-range Integrated Architecture® system. The CompactLogix™ controllers use a common control engine with a common development environment using Logix5000™ software, which significantly reduces the time required to design, develop and deliver the solution.

As systems become more connected and complex, the time and effort needed to design, configure and maintain machinery and equipment is coming under greater scrutiny, especially as systems become more connected and complex.

Improved integration between the automation controller and system devices is providing new time and cost saving opportunities. Programming controllers, configuring devices and managing maintenance activities within a single software environment can achieve this integration.

The advanced motion control for Liquid Pack's filling machine is delivered by the Kinetix® Servo drives which communicate directly with the controller. Allen-Bradley PowerFlex® drives also have embedded Ethernet/IP™ communications. "The Ethernet connectivity between the controller, HMI, servos and drives reduces wiring, panel space and commissioning," explained Campbell.

The filling head is servo driven as opposed to pneumatically driven which provides repeatability and improves the accuracy of the filling machine. Pneumatic filling heads are subject to variations caused by air pressure, humidity, altitude and temperature but because servos are electrically driven, they provide consistent and repeatable positional accuracy.

According to Jarrod Grech, NHP, "The innovative design of Liquid Pack's filling machine allows for controlled repeatability of filling with accuracy to plus or minus only one millilitre."

This solution enabled the filler to take product directly from the tank farm rather than a surge tank. Additionally, it is a more reliable measurement in regards to accuracy and repeatability, the Servo Motor is a critical component in achieving this. The Add-On profiles (AOP) available in Logix for the Kinetix Servos and PowerFlex drives reduced development time and made integration very simple.

"We have had some great results on the containers with repeatability and the Servo Movement is a big benefit," explained Russell Jones.

## More Filling, Less Downtime

When it comes to high volume filling, reducing downtime is a key priority. The Liquid Pack filling machine can detect if there is a container under the filling head or if the container is incorrectly positioned by means of current feedback from the servo controller. This helps prevent damage to the filling heads that are very expensive and also avoids any spillage, both of which would cause significant downtime to rectify.

The filling machine can be monitored in real time through remote connectivity and with a large range of local stock at hand and resources around Australia, Rockwell Automation and NHP are well placed to provide technical support to help minimise downtime.



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