



Eight-head filling machine uses single PLC control configuration

To meet the quality and service expectations of today's retail consumers, the entire supply chain has to work together to support the famous names of the high street.

Kerry Flavours & Ingredients has worked with machine builder SP Filling Systems and Mitsubishi Electric control specialists to develop an improved machine for filling catering sized bottles with flavouring syrups for coffee, ice cream and other desserts.

With shops and cafes opening seven days a week and for longer and longer hours, delivery of ingredients is becoming an ever-more precise operation. The correct products must be delivered on time with absolutely minimal wastage, often more than once in a day.

"Filling may not sound glamorous, but it is one of the critical steps in the process," says Colin Jones of SP Filling in Llandrindod Wells in Mid-Wales. "Spills and drips can lead to product wastage, spoiled packaging and hygiene issues, so we like to get the syrup into the bottle and the cap securely on in one smooth operation."

Knowing that the operating specification would be demanding Colin brought in motion and control specialists from Mitsubishi Electric at an early stage. While performance was going to be key, budgets were tight, and there was the realisation that the system would have to be flexible enough to cope with the changes that the future would inevitably bring.

"From the start we were committed to using stainless steel flexible impeller pumps and an eight-head filling geometry. My initial thought was that we should use stepper motors because they were cheap. However, the Mitsubishi specialists suggested we look at the company's MRE servo motor, which met the cost criteria and whose closed loop configuration would lead to guaranteed long term accuracy and easy reprogramming."

Colin was also surprised at the tech team's suggestion for a control system. He had assumed a small PLC (programmable logic controller) for each pump/motor, plus a larger one in a supervisory role.



- Flexible for easy customisation for individual jobs
- Long term accuracy
- Easy programming and re-programming
- Powerful machine controller
- Cost effective solution



However, Mitsubishi Electric were confident that the whole system could be run from a single PLC and explained that: "Mitsubishi Electric's Q-series PLC is justifiably recognised as hugely powerful and effective; as such they are often used in major installations like petrochem plants, cement works and automotive factories. The entry level Q-00J is in fact a low cost but powerful machine controller that can be customised to individual jobs by the addition of specialised output cards." For the syrup filler, the Mitsubishi control system consisted of a single Q-00J with one output card, an eight-channel pulse chain driver that controls all the filling axes in one hit with hardly any system configuration and commissioning effort at all!

When Colin went to visit Kerry in nearby Tenbury Wells initial discussions revolved around the physical characteristics of the syrups. Their viscosity, tendency to foam, drip and dribble, all have a direct bearing on how they are best handled. The shape of the bottles is also important, we must ensure there is a clear exit route for the displaced air or we will end up with bubbles and inaccurate volumes.

"By the time we had been through all the possible combinations and permutations, we had a technical specification that was dauntingly long and detailed. I dreaded showing it to Mitsubishi Electric, but they barely blinked an eye. Indeed they had a nice surprise for me."

The engineers had already written a program that allowed the machine operators to simply select the syrup-type and enter details such as bottle size, production run and timings and everything was set automatically for optimum performance.

"The best thing was that we had saved so much money on the drives and controls that we could afford to fit a Mitsubishi GOT flat screen HMI (human machine interface) which makes setting and operating the machine as simple as possible."

The filling machine was commissioned in July 2011, since when not a single bottle of syrup has been returned as under/overfilled, fouled by a dribble or compromised with air bubbles. Colin is confident that it will prove robust and reliable for many years to come.