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The machine, which is used to create multi-chamber reagent packs, incorporates multiple stages

Our experiences over the last few years have brought into sharp relief the reliance society places on laboratory companies, the personnel they employ and the technology they use to deliver essential medical insights.

This sudden upsurge in demand for their services has led some OEM and end-user companies to re-evaluate their current technology, by asking the simple questions: "Can we do this faster, more accurately, more reliably and more efficiently?"

One such company, with customers asking these searching questions, is Ward Automation. Based in County Sligo, Ireland, Ward Automation is a specialist in the design, development, and fabrication of bespoke automation solutions for the medical device, pharmaceutical and high-end manufacturing industries.

"We were challenged by a leading laboratory sciences customer to evaluate the design of its current reagent pack filling and labelling line," explains Kenny Ward, Business Development Manager at Ward Automation. "Following an in-depth analysis, we formulated a wholesale redesign, which, as well as addressing multiple limitations, also brought two primary processes into a single machine envelope. And, thanks to our deployment of contemporary digital technology, we have significantly boosted its accuracy, reliability, and future-proof credentials."

The machine, which is used to create multi-chamber reagent packs, incorporates multiple stages, including barcode-label application, filling, weighing, heat sealing, laser trimming, elastomer application, top-label application, and inspection. Operating at



Allen-Bradley
CompactLogix PAC



Allen-Bradley PowerFlex 525
variable-speed drive



Allen-Bradley
Kinetix 5500 servo drives



Once filled, the chambers have a plastic film applied and heat sealed using a servo actuator

20 parts per minute, each stage relies on precise movement, transitions, and interactions to deliver the necessary quality levels demanded by the industry.

“One of the main challenges we faced was ensuring pump accuracy, as each chamber had to be filled to an accuracy of 0.02 ml,” Ward explains. “Standard pump heads used in this type of machine have built-in controllers, which allow you to set the fill volumes but offer very limited closed-loop feedback. As such, it is hard to factor in ‘bedding in’ and environmental influences, both of which are among the many stimuli that can affect dosing accuracy. Indeed, dose one could be radically different to dose 100 and you may not know about it.”

Ward’s solution was to use a servo-based pump architecture, which closely ties the pump stroke to a check weigher. Using the weight figures, the pump is adjusted either up or down to match the optimal figures. Not only does this result in 100% in-process weight checks, but it delivers an accuracy of 0.001 ml.

Once filled, the chambers have a plastic film applied and heat sealed using a servo actuator. The film is then trimmed to size using a CO₂ laser, after which, an elastomer gasket and secondary label is applied. Multiple vision systems are used for quality control and to guide a SCARA robot.

“As a result of our use of smart, digitally capable technology,” Ward adds, “we have successfully delivered a complex single-cell machine with 26 separate product processes in a footprint less than 50% the size of the existing filling and labelling equipment. Not only has this saved valuable cleanroom real estate, but we have unlocked significant amounts of in-process data, which the customer can use to fine tune every step of the process. A single cartridge may have as many as 100 data points, all of which can be readily shared with other stakeholders thanks to the tight integration of the Rockwell Automation process and control platform.”

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