

Application Story

Industry: Food & Beverage

Products: Servo/Motion, PLC, Inverter, HMI, Software

Smart conveyor lines up quiches for precision baking

In the drive to reduce packaging, a specialist machinery builder has developed a pressureless queuing conveyor for collating quiches prior to baking.

The challenge: improve efficiency and control of conveyor

Uncooked quiches are difficult to handle, the filling being liquid and the raw pastry being soft. But when manufactured in commercial volumes they need to be moved quickly through the production process, so are in danger of collapsing and thus disrupting production.

In the past the solution was to use an aluminum foil dish to hold each quiche. The dish then became part of the final packaging. However, with consumers wanting reduced packaging, there is a move to less robust paper dishes

Machine builder Western Mechanical Handling (WMH), of Callington UK, has addressed this with what has become known as pressureless queuing or collating conveyor. The problem WMH had to solve was collecting randomly arriving raw quiches into neat rows of set numbers with orderly spacing between them so that they can be transferred onto a conveyor oven for cooking.

The solution: Mitsubishi Electric's Servo/Motion systems and iQ platform

The solution they developed was an in-line servo-controlled collating conveyor and intelligent sensing system. Quiches are delivered to this from the main conveyor at random time intervals, the sensors identify the position of the next quiche on the main conveyor, calculate the time until its delivery and adjust the collating conveyor's speed to optimise the spacing between the quiches. When a line of quiches is complete they are transferred laterally into the oven.

In fact the quiche collator is actually made up of three smaller independently controlled conveyors, each driven by a Mitsubishi HF-KP73 servo motor and associated MR-J3-70B servo amplifier and coordinated by a Mitsubishi PLC, a MELSEC Q controller. The HF-KP73 motors are low inertia units so respond well to rapid changes in speed and are energy efficient.

The MR-J3 servoamps combine plug and play installation and simple operation with high level motion control performance. WMH found their advanced vibration suppression system particularly useful considering the quiche filling is liquid, while the advanced real-time auto tuning ensures maximum precision for aligning and positioning the quiches.

The Mitsubishi Electric MELSEC system Q PLC is a multidisciplinary automation platform that combines all the elements of common automation systems into one compact, integrated, high



“The quiche project gave us a chance to perfect what has become known as pressureless queuing or collating. In fact the automation solution of Mitsubishi Electric is applicable to any product, pies and pizzas for instance, although it could also be used way beyond the food industry.”

Matt Hurley of
Western Mechanical Handling (WMH)

performance system. It provides a Multi-CPU-system and a backplane onto which application specific controller modules are easily mounted to build a tailored solution. That gives the possibility to easily realise controller, motion, CNC and robot application in one system. The Q170MCPUCPU used by WMH provides combined motion and logic control in a single module.

Result: More flexibility to fit permanent changes in food production

In operation the collating conveyor has to adapt to three different sizes of quiche: four-inch which are formed into rows of 10; six-inch grouped into eights, and large rectangular family-sized quiches which fit four across. However WMH knew that it was essential to build even more flexibility into the conveyor, because the one constant in the food industry is change – it is a certainty that new quiche sizes and shapes will be required on a fairly regular basis and that this will lead to different collating requirements. WMH's experience with Mitsubishi Electric convince them to rely on Mitsubishi equipment as it is perfectly designed also to handle such kind of sort of eventually. It offers the possibility to easily re-program the conveyor for new requirements. That makes it possible to swap between quiches, pies, flans, tarts and pizzas on an hourly basis, if required.

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