

MOTION CONTROLLER PERFECTS YORKSHIRE PUDDING RECIPE

For the perfect Yorkshire pudding you need exactly the right amount of batter, neither too much nor too little. Western Mechanical Handling (WMH) UK Ltd has developed a system to produce perfect results every time.

The Cornish machine builder specialises in automated food handling systems, many of which use the most sophisticated of modern drive and control equipment supplied by automation specialist Mitsubishi Electric.

WMH recently developed an entirely new technology for depositing Yorkshire pudding batter into baking moulds for a frozen foods manufacturer.

Previously the standard method, based on motors running for a set time, proved inconsistent and temperamental. An approach which often caused variation in final weight of the end product and stoppages to production.

To overcome these issues, WMH Automation developed a servo based system which irons out the inaccuracies of batter pumping whilst increasing throughput.

Using peristaltic pumps, product delivery is now accurate to +/- 0.1g. The batter is fed through a flexible tube fitted inside a circular pump casing in which rollers move to squeeze the tube and cause the batter to flow forward.

To achieve the steadiest flow possible, WMH has mapped the pump into discrete operational zones where the batter flow rate varies and is using the latest servo technology from Mitsubishi to ensure total accuracy.

The system is based on a 10 axis MR-J3 servo drive arrangement. Each servo is linked together by Mitsubishi Electric's high speed SSC net. Nine of the axes are dedicated to the depositors, each driving 32 pump chambers. The servos are each programmed with a map of known volume to be dispensed and the required number of rotations can be calculated depending on the required product settings.



- ***Increased production***
- ***Cost effective design***
- ***Ease of service & support***
- ***Ensures total accuracy***
- ***Waste reduction***
- ***Reduction in on-site commissioning time***
- ***Improved monitoring***

An anti-drip mechanism was also designed into the system which stops excess product causing cleaning issues later in the production cycle. The servos create a slight vacuum to draw excess batter back into the nozzle at the end of each cycle.

The tenth axis drives the depositor heads carriage which synchronises with the conveyor speed, as detected via encoder feedback. This helps increase throughput and reduce waste.

All the servo motor functions are controlled by the latest Mitsubishi Q170M motion controller running on a Q series PLC (programmable logic controller).

Matt Hurley – Control Systems Engineer for WMH is a keen advocate of Mitsubishi's function block programming technology. Matt has used function blocks to control multiple applications in the past using GX IEC Developer software tools.

He explains:

"Each servo drive has a common function block which calculates the required amount of batter to be dispensed, the position of the pump and the type of batter. It also selects the number of dispensing heads to be used. This method of programming has led to efficiencies in the programming time and also reduced commissioning time on site."

MT Designer, Mitsubishi's dedicated motion design tool, simplified the configuration of the servo allowing WMH to parameterise the motion requirements. The software allowed easy programming, monitoring, system testing and ongoing maintenance.

Operator control and status information is provided by a GOT1555, one of the latest HMI products from Mitsubishi. The unit displays current status, alarms and diagnostics. It also allows recipe selection and management with just a finger touch from the operator including "cleaning in position" and priming modes.

For further information about this or other bakery solutions, please contact the solutions team at automation@meuk.mee.com.