

bakery - processing

Small is beautiful



In an era when food processing has become dominated by fewer and fewer large manufacturers, the bakery sector illustrates a counter-trend, with SMEs and start-ups mounting a challenge particularly in speciality, ethnic and other niche product areas, *writes Paul Gander.*

But cost pressures remain high and margins low. Mike Wilkinson, managing director of The Food Machinery Company, says that although his company does not supply second-hand equipment, this is the route being taken by increasing numbers of price-conscious bakers who would normally not consider that option.

In the past, Wilkinson has focused on equipment from the European companies that it represents, notably Caplain of France, to meet the needs of customers in the bracket of 150 employees and a turnover of up to £5m. But like other PPMA members, he has more recently put time and effort into exploring the potential of the Chinese machinery market.

"There are factories turning out low-cost, but very high-quality equipment," says Wilkinson. "Over the next 12 months or so, we will be introducing bakery ranges from mixing all the way through to continuous ovens."

"This is brand-new equipment, selling for less than the cost of 20-year-old second-hand machinery from Europe."

If bakers are under pressure to reduce costs, this cannot be at the expense of product quality. The way the dough is prepared and handled makes a huge difference to final product quality.

Baker Perkins is among those suppliers emphasising gentler dough handling as a way of improving quality without necessarily incurring additional costs. It may even help reduce costs. In the latest changes to its equipment range its mixing, dividing and moulding processes have been upgraded and, in many cases, given finer controls, says the company.

Crucially, it argues, preserving the integrity of the dough structure through these separate process phases results in a loaf with a more pleasing texture.

Tweedy mixers, Accurist dividers and Multitex moulders form the backbone of Baker Perkins' high-output bakery plant portfolio. The latest generation Accurist 2 ram-and-knife dough divider is among those systems which can combine improved control and quality with lower production costs, the company claims.

At the same time, the fundamental benefits of the original machine are said to remain

continued on page 36

BAKERY BITES

Wheat facts:

- World wheat prices rose 120 per cent last year
- Excessive rain damaged UK and US crops
- Drought curbed yields in Canada and Australia
- In a good year, the UK can supply 80 per cent of its own breadmaking wheat
- It is predicted that there will be a record world wheat harvest in 2008/09 that could help to reduce wheat prices on global markets.

- **What is (really) old is new again** as the latest craze sweeping the food industry worldwide is ancient grains which has led to their use more than doubling since 2005. Packaged food and beverage markets are seeing a growing influx of new products featuring grains that were in favour thousands of years ago, according to Datamonitor's Productscan Online database.

- **National Doughnut Week** took place in mid May and was celebrated in bakeries across the UK. The event, which is supported by BakeMark UK hoped to raise £50,000 for the Children's Trust, beating the £40,000 raised last time. Bakers up and down the country produce limited edition doughnuts, including Townend Bakery in Liverpool which produces a special star shaped version. In Kent the enterprising son of one baker who works for AE Barrow & Sons sold doughnuts to his classmates and organised an art competition. Their artwork was displayed in a local café.



The Food Machinery Company's FC1660 rack loading convection oven (left) and the Caplain FRP6 Rotary rack convection oven (right)

bakery - processing

BAKERY BITES

Bread facts:

- The price of a loaf of bread has hit an all-time high as food price inflation continues to push up the cost of weekly shopping bills.
- British bread prices have risen by between 15 - 20 per cent in the past year as commodity and fuel costs bite, but a loaf of bread is still cheaper in the UK than in most of the rest of the world.
- The Economist Intelligence Unit's (EIU) Worldwide Cost of Living Survey found that the average price of a kilo of bread in London had risen to £1.45p (at the end of last year) from £1.09 in September 2006.
- The rises in the UK had been compounded by the strength of sterling and weakness of the US dollar. But bread is more expensive in Poland, Turkey and Spain. The most expensive city for bread remains Vienna in Austria, with bread prices averaging £4.22 per kilo.

continued from page 35

unchanged. So scaling accuracy is as consistent as ever, achieving sustained standard deviation of just 2.5g-3.5g on an 800g loaf over 10,000 hours of operation.

But the introduction of servo control to the ram movement now permits low-pressure operation for reduced product damage and improved final quality. As Baker Perkins explains: "The lower the pressure, the higher the cell count - or the number of micro-bubbles retained in the dough structure."



Multitex moulders form part of the backbone of Baker Perkins' high-output bakery plant portfolio

This affects not only the feel and texture of the bread, with a finer and more resilient crumb structure, but it can also help to improve colour.

Moving down the line, the Multitex 4 dough moulder uses what Baker Perkins claims is a unique arrangement of four pairs of sheeting rollers. This configuration is said to improve quality by controlling the size, shape and importantly, the

length-to-width ratio of the dough sheet before coiling. This in turn allows more and tighter coils. At the same time, the gradual reduction in thickness reduces stress to the dough.

Mixing, dividing and moulding operations can be installed either as part of an integrated system or as stand-alone units to support an existing line. Retrofit enhancements to equipment that is already long in the tooth are also possible.

Earlier this year at the Baking Industry Exhibition, supplier of ovens, mixers and other bakery process apparatus Tom Chandley emphasised 'control'. Many of its customers will be wishing they had more control – not only over their ovens, but also their costs, particularly for energy and ingredients.

The concerns about energy costs may be one reason why customers are attaching more importance to oven controls. For use with its convection oven range Chandley showed the Turbo colour touch-screen controller for the first time and the programmable Dual controller, for use with the company's deck and rack ovens.

The Turbo controller has been designed with master bakers in mind. Integrated into Chandley's Convecta ovens, the controller can be pre-programmed with up to 20 different bake programmes. Consistency even when equipment is operated by semi-skilled staff is a key requirement; but access to the control module requires pass code authorisation.

The Dual controller allows rack and deck ovens to be set to any one of up to 99 bake programmes, again making it suitable for semi-skilled operation. The controls operate on three-step bake phases.

continued on page 39

bakery

continued from page 36

Automatic steam and damper systems are standard, and there is a bake timer as well as a 24-hour timer for every deck.

Both the Dual and Turbo controllers have energy saving features that automatically switch them off when they are not in use. A maximum electrical load can be specified through the Power Limiter function. This, says Tom Chandley, can result in cuts in energy costs of between 20 per cent and 40 per cent.

Recent installations for Tom Chandley have included a Compacta oven for Scottish customer Shortbread House. This is the fourth oven that the company has purchased from the supplier.

Packing it up ...

When it comes to packing loaves of bread, the established system of filling and closing preformed clear or printed bags continues to dominate the UK market. One key player is German supplier PS Mako, a partner company to Optima Packaging Machinery. Mako has machines in output ranges from around 45-90 bags/minute, says Optima UK sales director Peter Kierans.

"In the UK, we've tended to supply other bakery equipment companies putting in complete line installations," says Kierans. "But in the rest of Europe it is more common to sell direct to bakery companies."

Bags can be folded and sealed shut or bunched and tied, typically with a tamper-evident tape system. But one key recent development has been the ClipStrip closure, which uses a more rigid plastic system for full and effective reclosability. Importantly, as well as offering easier and more reliable reclosing it does not contain any metal parts, so avoiding a potential hazard for consumers.

At interpack, Mako showed lower-output fully-automatic versions of machines in its Rianta range, twinned with inline slicers or roll-feeding units. The line can be further extended with conveyors and checkweighers, metal detectors,

case packers and other end-of-line equipment, says Optima.

There is no reason why whole or even sliced loaves cannot be flow-wrapped rather than fed into pre-formed bags. PFM Packaging Machinery supplies many machines into the sweet bakery and speciality breads markets in the UK, but mainstream sliced loaves have remained an elusive target. This is despite the fact that it has tried-and-tested systems for handling and wrapping on-edge product, and the demand for PFM flow-wrap equipment from sliced bread producers in other parts of Europe.

Sales director Chris Bolton explains: "We have talked to the likes of Warburtons about this, but the feeling was that their marketing departments would not be keen on a change of format. However, in terms of speed and efficiency, I think there would be benefits in moving to flow-wrapping, particularly for smaller loaves."

For baked goods of various sorts, PFM offers the Swift mechanical machine as an entry-level option. It is flexible, says Bolton, and can take product up to 350mm long.

For higher outputs and potentially larger product, the Pearl can handle items up to 500mm in width, while the Hurricane stretches to widths of up to 700mm. Importantly, both these ranges integrate servo drives and offer no-product-no-bag and misplaced product detection. Slat conveyors can help with potentially unstable products.

For even higher speeds, automatic feeding can be combined with a Falcon menu-driven wrapper. The sealing speed of the particular film and the nature of the specific product will determine output, Bolton explains. But on small individually-wrapped items, the Falcon can achieve speeds of up to 200 packs/minute.

Of course, ethnic and speciality breads account for an increasing share of the overall 'bakery' market in the UK, and these items may lend themselves far more to flow-wrapping. Bolton cites the example of Mumtaz, of Bradford, where a Falcon machine is wrapping naan bread.

"We also get the odd request for modified atmosphere packaging (MAP) in the bakery sector," says Bolton. This can be applied using the Mistral and Scirocco machines, the latter is capable of matching the Falcon's speeds of up to 200 hermetically-sealed packs/minute.

Flow-wrapping has already carved out a niche in the sweet baked goods sector. Bolton says that PFM has sold a high-speed line to one of the UK's largest bakeries, where it will be wrapping bite-sized cakes. And Memory Lane Cakes in Cardiff recently rented a Swift machine to meet a spike in demand for its small celebration cakes.

BAKERY BITES

- **Sara Lee Corp** announced third quarter profits up \$7m to \$249m largely on the back of improved sales in its global bakery enterprises.

In the USA product sales rose 11 per cent, due mainly to higher selling prices which also helped its international bakery turnover improve by 18.9 per cent to \$231m.

- **The FDF and London Technology Network** hosted an industry forum in April where United Biscuits, Cadbury Schweppes and Tate & Lyle outlined their carbon cutting programmes.

United Biscuits has implemented several changes including new oven burners at its Harlesden biscuit plant to reduce energy consumption. Changes will be rolled out across five other UB plants over the next three years. The company also wants to reduce waste generated in food production by cutting its use of water and landfill as well as reducing its CO2 emissions from transport by 22 per cent.

FURTHER INFORMATION

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PFM's Pearl for higher outputs and larger products

bakery & confectionery - automation & control

Handle with care

Automation is critical to bakers and confectioners: from the high volume industrial producer to the small craft-based artisan operation, consistent productivity levels are critical if orders are to be fulfilled and customers kept happy. Here Bob Dobson looks at some recent installations and their benefits to the user.

Bakery goods usually require special handling, since they are irregular in shape, delicate and easily broken. Manual packaging is still the norm, but intelligent, adaptable technologies are now emerging that can reduce dependence on manpower.

Tecno Pack specialises in the flow-packing of bakery goods and in particular, in the manufacture of packaging machines and packaging systems for croissants, snacks and breadsticks. It is steadily making greater use of robotics for duties such as muffin packing.

The customer had specified packing 350 muffins/minute, placed in trays of two and four, a rate that made robots essential. Tecno Pack's solution used four ABB IRB 340 robot pickers, specially designed for the rapid movement of consumer goods.

The use of a double unit ensures that the plant can operate both at full capacity and at half speed. In addition, the unit can pack two different

products – for example, a plain muffin and a chocolate muffin – in a mixed arrangement.

The equipment uses a viewing system combined with an ABB PickMaster control system that is capable of recognising objects set down on the moving conveyor in a random way and providing the proper input to the robot for high-speed pick-up. In this way it is also possible to carry out shape quality control.

ABB's electric motors division has developed considerable expertise in energy optimisation in bakeries. At Cereform, the only manufacturer of soya flour in the UK, all 120 motors are gradually being replaced with high-efficiency alternatives. The nine flour mills on site, for instance, each use two 22-kilowatt motors to turn the 80-kilogram plates that grind the soya beans.

The 18 new EFF1 motors are saving more than £10,000 a year in energy, thanks to their high-efficiency performance. A further annual saving of around £5,000 is made through reduced maintenance.

German efficiency

To maximise production volumes, Riehle Maschinenbau GmbH & Co. KG in Aalen, Germany, has developed new lye application equipment for bakeries, which can be operated by a single operator.

Precision linear drives from Hoerbiger-Origa in the feeding station constitute the core of these systems. Here, the dough pieces are transported into the fully automated lye application machine. The linear drives, the materials and protection category adapted specifically to the relevant hygiene requirements, ensure precise movement of the lift table as well as throughput of 200 trays/hour.

The lye application machine utilises a fully automatic infeed. Carriers are simply docked and the dough pieces, pretzels for example, are automatically transported from the feeding station into the lye application machine.

The carts carrying the dough pieces are recognised by sensors in the feeding station and

continued on page 42

A & C CLIPS

■ **Witt Gas** has started to equip its 'PA' gas analysis devices with built in thermal printers inside the housing. The benefit, says the company, is that the measured data is available immediately in printed form. It can be pre-set to produce the data at intervals between 10 seconds and 30 minutes.
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■ The industrial coating division of **Nordson** has introduced the cScan+ film measurement gauge which can measure the varnish coating on the outside of metal cans and the internal lacquer on the inside between 20 nanometers and 200 microns, according to the company. Coatings may be both organic and non-organic and the data can be used to build a topographic map of the coating distribution on the substrate to identify where excess applications can be eliminated to save costs and maintain container quality. The gauge was launched at MetPak in Essen recently.
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■ **An US bakery industry** expert says one of the main reasons for upgrading bakery ovens is to take advantage of the encoded control systems in new equipment. New ovens take advantage of PLC technology which offers recipe management systems to set up baking profiles for each product and aid changeover between different baked goods. Changing oven parameters automatically saves time as well as improving quality and safety.



At Cereform, the only manufacturer of soya flour in the UK, all 120 motors are being replaced with high efficiency alternatives



BAKERY BITES

■ **Rockwell Automation** has introduced the Allen-Bradley Guardmaster SensaGuard family of non-contact switches. 4/SIL 3 rated they feature the latest generation RFID technology for coding and inductive technology for sensing.

It has also launched Connected Components to help meet requirements for controls on standalone machines. They are built around MicroLogix PLCs, PowerFlex 4 class drives and the new PanelView Component HMI.

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■ **The consumer obsession** with Health is set to hit the bakery sector according to Euromonitor's report 'Bakery Products: top trends for 2008 and beyond'. A priority for bakery ingredients and finished goods manufacturers is to boost nutritional and functional ingredients like plant sterols, says the report.

■ **Folic acid** should be used in more bakery products; the Government is currently discussing whether flour should be fortified with the nutrient by law.

■ **Fritsch** launched a filling machine for baked goods at interpack. It includes an integrated control cabinet and improved accuracy and hygiene. The Fritsch Universal Filling Unit, is designed to handle fillings such as jams and other chunky viscous fillings, says the company. It features an intelligent control system which ensures no dough sheet no filling.
www.fritsch.de

bakery & confectionery - automation & control

continued from page 41

locked in place by Hoerbiger-Origa pneumatic cylinders. A light barrier checks the position of the dough piece carriers and the operator releases them for transport once the correct alignment has been achieved.

A lift table, driven by two Hoerbiger-Origa electrical linear drives, moves vertically to the upper level of the cart. For the automatic transfer of the dough pieces, the lift table is extended horizontally by two pneumatic linear drives.

The conveyor belt then starts up and takes the dough pieces from the first carrier. Once all pieces have been transferred, the pneumatic linear drives retract again. The lift table is then lowered by the electrical linear drives to the transfer position for the lye application machine, the dough pieces are conveyed, and the unloading process continues with the next cart level.

At the same time, the lye and optional salt is automatically applied to the dough pieces, which are then deposited onto a baking tray. This fully automated system, which is operated by a single operator, processes more than 200 trays/hour.

Dough balls

Hull-based Apple Engineering was asked to develop an automated dough ball handling machine which would deposit accurate amounts of garlic butter in the centre of a dough ball, at a rate of four dough balls/second.

As a dairy product, garlic butter is temperature critical: it needs to be handled at the lowest possible temperature to minimise health risks and maintain product consistency. And that makes it far harder to pump and dispense accurately.

A nested conveyor transfers the dough balls from a buffer hopper at the end of the bakery's production line to the garlic butter injection stage.



Apple Engineering's automated dough ball filling machine



Festo CDVI control valve terminals used in Apple Engineering's automated dough ball filling machine

Here, an indexed conveyor ensures that each batch of dough balls is accurately aligned with the machine's multi-injector depositor before the garlic butter is dispensed. Then, it's over to the filling process.

Apple's customer specified that all pneumatic parts should be from Festo. Most of the cylinders selected are Festo DSNU models, with custom stroke lengths. For the control valve terminals, Apple chose Festo CDVI models, with environmental protection ratings up to IP69K, smooth easy-clean surfaces, and the ability to tolerate the type of washdown chemicals used in the food industry.

Across the pond

A hearth bread and roll processing line at Pepperidge Farm bakery in Florida has reduced scrap thanks to a British developed motion controller.

Dough will move sideways of its own accord when it's being conveyed along a process. So, photoelectric sensors are often used to detect if dough balls are off-centre and could cause a problem. But this technique is crude, so slightly off-line dough can end up being scrapped unnecessarily.

Pepperidge Farm replaced the photoelectrics with an LED beam array to provide precise data on the actual position of each dough ball, and corrected the problem by shifting a conveyor section in real-time using a servo-driven cylinder.

Baldor's SmartMove was a natural choice for the motion controller, because of its built-in analogue I/O, and its Mint high level programming language. At Pepperidge Farm, a 100-line program is loaded into SmartMove's non-volatile memory to automatically correct dough position on a short conveyor section before it reaches the

continued on page 44