

READY MEALS REPORT

MICK WHITWORTH REPORTS ON MACHINERY DEVELOPMENTS, FROM PREPARATION, THROUGH TO FINAL PACKAGING, WITH A LOOK FIRST AT A GROWING SCOTTISH BUSINESS.

CASE STUDY: UNIQ PREPARED FOODS - ANNAN

Smoked salmon cottage industry evolves into ready meals

In the mid-1970s Pinneys of Scotland was little more than a cottage-scale producer of fresh and smoked salmon and trout.

Today, as part of Uniq Plc and consequently renamed Uniq Prepared Foods – Annan, it is one of the UK's biggest specialist suppliers of fish and seafood products to retail multiples. Its product range remains centred on Scottish farmed salmon, but ready meals, terrines, appetisers and other prepared foods have now become as important as traditional sliced smoked fish. Ready meals alone account for around a third of turnover.

The Annan operation comprises an 11,500 sq metre factory on a 36,000 sq metre site, and is highly complex, with a variety of processes feeding into each other. Whole fish may be used smoked, poached or raw, and with off-cuts from the smoked salmon and ready meals businesses being re-deployed as ingredients in patés and mousses. Product is constantly criss-crossing the factory, and tracking these internal transfers on a paper-based system is a major challenge.

Up to 250 tonnes of fresh farmed fish arrives each week and about a third of this will be hand-filleted ready for curing and smoking. The bulk, however, is headed, filleted and pin-boned by machine to create what Uniq calls 'prep sides'. These are skinless, boneless sides of fish, which will then be portioned. Most of the sides are machine-cut by water jets, although premium cuts will be hand-crafted.

Retail fish portions are chiefly packed in fixed-weight MAP trays, produced on Tiromat and Dixie thermoformers, while a few are



New cooking plant: Operations manager William Duncanson with the cook-quench-chill unit

bagged on a Sandiacre vertical form-fill-seal machine. Other fish is transferred to the cooking and preparation hall where it will generally be poached to provide either whole fillets or flaked fish for recipe dishes, patés and mousses. But some fillets are left uncooked, to be incorporated in oven-ready 'semi-prepared' dishes, usually packed in foil trays.

Demand for semi-prepared meals

Operations manager William Duncanson, says the business is seeing strong and growing demand for semi-prepared meals – typically a raw salmon portion accompanied by a sauce. So much so, in fact, that it has closed down a low-volume seafood salads operation to create space for a dedicated semi-prepared meals section.

Mr Duncanson says these products fall somewhere between plain fish portions and microwaveable, ready-to-eat recipe dishes. And since the meals will be fully cooked at home by the consumer, production is not classed as fully high-risk. "Predominantly these are very simple depositing operations," he says. "We take fillets that were cut in the butchery section, we put the portions in pre-formed trays or foil, and deposit a sauce. So it's not highly automated at this stage – although I guess, longer term, it depends what happens on volumes."

There is more automation in the production of fully prepared ready meals. However, the factory's focus on relatively low-volume, speciality seafood dishes calls for a wide range of preparation methods and ingredients – there are up to 20 components in some products – so a fully automated line would not be appropriate.

"Chicken is the best seller in ready meals, and fish dishes are a bit of a niche," explains Mr Duncanson, "so we have focused on high quality, putting a lot of effort into sauces and ingredients, but keeping the flexibility of labour so, for example, we do quite a few different garnishes."

The low-risk cooking and preparation area includes a combination of brat pans, continuous steam cookers, batch cookers and a 'form cooker' to create a pan-seared effect, particularly on prawns. "A lot of our recipe dishes, like prawn curries, are based on warm water prawns," explains Mr Duncanson. "We thaw them and rinse them, marinade them, then cook them in the form cooker, which has a Teflon belt, to give a seared effect."

Not all prawns need this treatment. Some are cooked on a Heat & Control steam belt cooker, which gives "a more succulent, plump eat".

A basket-fed water and steam blancher is used for blanching vegetables, rice and pasta. However, the growth of Uniq's ready meals business means this is fast becoming a bottleneck, so the company has just invested

£300,000 in a cook-quench-cool system from DC Norris, specifically to cook carbohydrates. This will not only provide extra capacity for rice and pasta but improve quality too.

Mr Duncanson explains: "The current blanching unit doesn't really provide a submersive cook – it pours a combination of steam and water over the product. The cook-quench-chill is a three-chamber system that is more like the pasta cooker you might use at home. There's room for the pasta or rice to move in the water, so you don't get so much clumping."

Cooked and agitated

The product is lowered, in a steel basket, into a chamber full of hot water where it is cooked and agitated. Then it is automatically hoisted into a second chamber containing cold water, which takes the temperature down. A third chamber chills the cooked product to below 4deg C. "It's simple, but it's the best way of cooking pasta," says Mr Duncanson.

For poaching salmon and other proteins, the company uses a pair of rack-fed batch steam cookers, which can either steam-cook or, if necessary, hot-smoke the product.

Methods of sauce preparation vary according to the recipe and the number of components. The operation might start with caramelising onions or cracking spices in a brat pan to make the base. But all sauces are then cooked in one of five kettles – a mix of Giusti and BPT (Skerman) equipment – then pumped through to high risk, where they are initially filled into stainless steel trays, then racked-up and wheeled into a blast chiller for cooling. "This is an area we'll be looking at in detail later this year," says Mr Duncanson. "Blast-cooling is fine, but there are other methods – you can bag-cool, you can cool on the line – and there may be ways we can extend shelf life depending on how we cook and cool."

With carbohydrates, proteins, vegetables and sauces all prepared, ready meals are assembled on one of two filling lines in a separate high-risk area. Sauces are machine-deposited into trays, while pasta, rice and garnishes are hand-filled using measuring scoops for portion control. "We're using Proseals to seal the pre-formed trays," says Mr Duncanson, "then it's on to a check-weigher, metal detector and, usually, sleeving up."

He continues: "I think the next wave in packaging could potentially be a move away from full-sleeve coverage, although it depends on the product."

PREPARATION AND COOKING

Kettleby Foods expands cooking and cooling capacity

Since Samworth Brothers set up Kettleby Foods in 1999 it has quickly become one of the big success stories in chilled ready meals. Samworth is best known for its Ginsters brand of pies and sandwiches, but Kettleby focuses on making traditional British favourites such as Cottage Pie, Cumberland Pie and Beef Stew & Dumplings under private label for the super-market multiples.

When its plant at Melton Mowbray, Leicestershire, was under construction in 1998, Kettleby opted to install sauce processing equipment from BPT (Skerman). Now, thanks to demand for a premium meals range from a high street retailer, Kettleby is expanding the factory's cooking and cooling capacity, installing further Hy-Mix cooking kettles and Bro-Cool batch cooling systems from the same supplier.

Both systems have proved successful throughout the prepared meals sector, where the Hy-Mix series is being employed with a variety of design options. These include inclined angle anchor agitators and PTFE wall scrapers; secondary paddle agitators to ensure thorough product movement throughout the cook cycle; single or split steam jackets at pressure ratings up to 10 bar, with the option of live direct steam injection; and a hydraulic cylinder arrangement to enable automatic lifting and safe lowering of the lid and agitator assembly.

In a typical application, cooked products are drawn from the Hy-Mix to the Bro-Cool unit under vacuum to ensure a complete transfer and to avoid pump damage to the sauce. The product is transferred via a pipe passing through the separation wall between low-risk and high-care sections of the factory.

Cooked product is cooled in the Bro-Cool units by the circulation of a propylene and water mixture through the specifically designed jackets, with a slow speed agitator and surface scrapers ensuring effective heat transfer. Nothing is removed from the cooked sauce except heat, says BPT (Skerman), and the integrity of the recipe is maintained.

The company's installations include a control system tailored to suit the process and the cus-

tomers' requirements. This can involve batch weight control, temperature profile control, simple relay logic controls or full recipe management software using HMI/PLC, with data recording and full password protection. Clean-in-place can also be built in.

Kettleby Foods is best known for its British dishes, but other cuisines call for different preparation techniques. D2 Food Systems has a particularly strong history in equipment to make Italian-style meals, supplying everything from individual machines to complete systems for ready meal production.

These include pasta making and cooking lines for lasagne and cannelloni. Systems are available from D2 to produce chilled lasagne sheet and filled cannelloni at line speeds from as little as 30 trays a minute to as many as 150.

Delivery of semolina

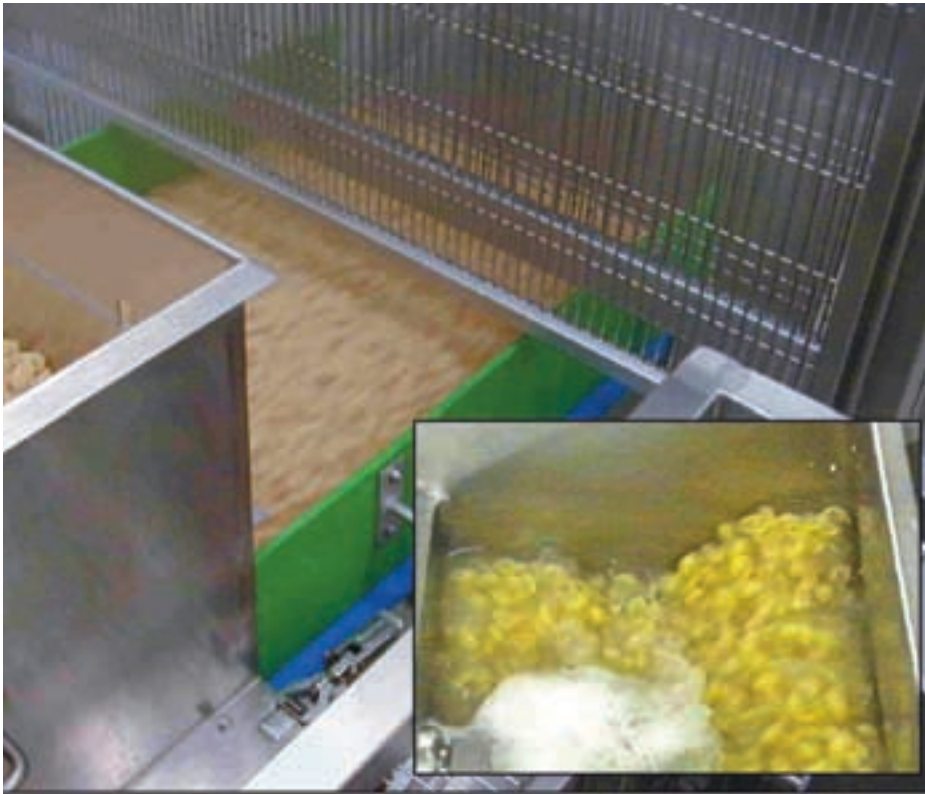
A typical D2 pasta line will start with automatic delivery of semolina from an external silo or internal FIBC. Water and egg is automatically metered into batch or continuous mixers, then a kneeder-sheeter produces a sheet of cold-rolled pasta. A continuous cooker, incorporating quench and chill sections, is followed by cannelloni forming and cutting.

D2's David Edwards says its latest generation of pasta kneeder-sheeters include a unique arrangement of kneading rollers. These are designed to produce high quality cold-rolled pasta with the texture and colour of an authentic product. They also create a pasta sheet with improved consistency and elasticity, and this, together with a special cooker design, is said to eliminate any chance of the sheet tearing during cooking.

When it comes to cooking pasta, rice or vegetables, Mr Edwards claims D2's Vortex cook-quench-chill system is "the most successful method on the market". Each day, he says, Vortex systems account for 150,000kg of pasta and rice production by UK ready meal makers.

The Vortex consists of a series of vessels arranged in-line with a clear divide between low and high risk. Product is contained and transferred using lifting and tilting baskets. Fully automatic operation is provided by product pre-feeders linked to load cells and, at the end of the process, by dewatering discharge conveyors.

Mr Edwards flags up a number of key benefits for the Vortex system. These include a controllable water agitator to ensure overall product consistency, gentle handling with "zero clumping", recipe management, programmable



Cooking and chilling: Vortex basket system combines the benefits of batch and continuous production

basket flushing, and automatic chill control to below 5deg C. Built-in hygiene features include coded, quick-release fittings and a self-clean programme.

Meanwhile, Pro-Cuisine of Malton in North Yorkshire has recently installed three Lagarde retorts and an automated handling system to produce extended shelf life ready meals.

High level of automation

Supplied via UK agent Holmach, the equipment provides a high level of automation together with accurate process control on a range of products from Duck à l'Orange to Chicken Tikka Masala and from Salmon Hollandaise to a wide variety of pasta and potato-topped dishes.

The three retorts are connected to an automatic basket loading shuttle – eliminating the need for operators to load the baskets into the retorts or into blast chillers after cooking.

Another principal name in cooking and cooling systems for ready meals and sauces is Terlet, part of the Netherlands-based MPE Group, which can supply individual machines or complete cooking and cooling lines.

Terlet steam-jacketed cooking vessels are normally supplied with bottom-driven scraped-wall anchor agitators, but a secondary top-mounted high shear mixer can be supplied as an option. The steam jacket has a stainless steel inner skin, spot-welded to a dimple plate outer skin. Coupled with generous insulation, this construction is said to give excellent heat trans-

fer characteristics, resulting in reduced process times.

For batch cooling of products containing large particulates, Terlet can supply glycol jacketed cooling vessels that combine gentle agitation with short cooling times. As the product drops in temperature and becomes more viscous, the agitator speed is reduced automatically to minimise risk of damage.

Terlet, which is represented in Britain by Grunwald UK, can also meet the need for continuous processing of products with particulates up to 25mm. The Terlotherm scraped surface heat exchanger has twin heating or cooling surfaces with double-acting scrapers, and is available in four sizes, the largest of which has a heat transfer area of 4.4 sq metres. This, say Terlet, offers the advantage of high throughput from minimum floor space.

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DEPOSITING, FILLING, SEALING

Handling difficult products automatically by machine

The sheer variety of ingredients, liquid and solid, needed for even a modest range of ready meals has made depositing and filling one of the more challenging sections to automate. Whether it's sliced, diced or whole-fillet meats, smaller particulates like peas, or wet sauces, each ingredient presents its own problems, and the frequent product changeovers in ready meals don't help the economics of automation.

So most manufacturers – unless they are turning out a fairly narrow range of products in particularly high volumes – still use a mix of manual, semi-automatic and fully automated filling systems.

But technology is gradually catching up, and even some of the most notoriously difficult products to fill, notably rice, are now being successfully handled by machine. And sometimes these technical solutions emerge from seemingly unconnected sources – such as the product counting machinery available from Dutch maker Cremer Speciaal machines.

Cremer has been around for 50 years, but its equipment was originally designed to count flower bulbs, not foodstuffs. Today, however, Cremer sells machines to count any 'non-interlocking' products at speeds that will match all but the fastest ready meal lines – up to 100 drops a minute when linked to an indexed conveyor. To make them suitable for food use, Cremer machines now incorporate features to ease cleaning and dismantling and are also sealed for hosing down.

"In the ready meals industry, the range of products that can be counted, rather than weighed, is extensive," says Roger Wayte of Cremer UK & Ireland. "We have supplied counters for dried, coated and frozen meat pieces, meat balls and croquettes and similar products, and also dried dates, olives, onions and potatoes.

"The product handling and contact is minimal and this means we can handle more tender products such as cherry tomatoes and similar ingredients in ready meals."

Weighing remains a more usual method than counting for ensuring each ready meal contains

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a consistent portions of meat or vegetables. The multihead weigher has been on the market for over 20 years and, according to one supplier, Bilwinco, has gradually replaced the traditional linear machine as a weighing and dosing unit. Advantages of the multihead system, it says, include high accuracy, speed and flexibility.

Bilwinco recently delivered a meat-filling system to replace a volumetric filler on a meat pie line where, it says, the manufacturer was accepting an 8g overweight on each pie to be sure of meeting legal requirements. The switch to a multihead weigher is said to have cut the average giveaway from 8g to 1.5g. At a line speed of 210 pies a minute, this added up to a saving of 82kg of meat an hour.

Bilwinco marketing manager Margit Simonsen says the frequent product changeovers in ready meal operations provide another argument for using multihead machines. "Many producers weigh and pack many different products in small batches. The multihead weigher, and the filling unit integrating the weigher with the packing line, ensures easy cleaning and quick preparation for another product."

Mobile weighing units

As well as handling small batches of different products, Bilwinco weighers can also be supplied as mobile units. This creates more flexibility in production planning and helps maximise utilisation of the equipment. It can also be an aid to hygiene. The weigher can be removed for separate cleaning, and lowered to the floor for easier access for both cleaning and maintenance.

Bilwinco's latest BW generation of multihead weighers is said to include a number of improvements over earlier models. Replacement of wearing parts has been speeded up, with load cells, for example, now accessed from outside the machine.

The weighing buckets have been redesigned to reduce noise during production, and a new vibratory module ensures that a bigger range of products, including sticky or greasy ingredients, can be handled. In the UK, Bilwinco is represented by Ancholme Machinery.

Another supplier that has been steadily improving its designs is Riggs Autopack, the Lancashire-based specialist in depositing and filling systems. Recent developments to its depositor include a new style of agitation system in the product hopper. According to sales manager Bob Lumb, this is becoming a necessary feature on more and more ready meal lines. "The general increase in particulate size



Pasta with two veg: Multi-Fill MPF is said to deliver difficult products accurately

in products such as stews, soups and casseroles requires agitation to gently hold the solids in suspension," he explains.

Riggs' solution incorporates an air-driven rotary actuator driving a paddle-type horizontal agitator fitted in the product hopper. Mr Lumb says the forward/reverse motion of this drive is easily controlled to suit the product – and the air drive means electrical power is not needed at the depositing point.

The drive is also "very economic on air consumption compared to conventional rotary air motors," he says, and the system can be used on depositors with up to four heads. The agitation blade can be easily removed for cleaning, and the hopper's low mounting point makes product loading easier and safer.

Another new development from Riggs is a ready meal make-up conveyor that can be used in conjunction with the upgraded depositor. The conveyor uses a chain and pusher-pad system to

drive the meal containers, and is programmable for single or double indexing, with variable dwell time, or for continuous motion.

Volumetric fillers are a standard feature of many ready meals systems, and US supplier Multi-Fill produces units designed to fill hard-to-handle ingredients where automation has previously proved tricky. For example, the company's MPF system is capable of depositing precise portions of cooked rice, pasta, vegetables and other meal components into trays, cartons or pouches.

"Generally, the more free flowing the product the better and more accurate the filling performance," says Gerry Lupton of F Jahn & Co, Multi-Fill's representative in the UK and Ireland. "But the MPF system has proved adept at handling cooked pastas such as noodles, spaghetti and tagliatelli, as well as vegetable pieces such as broccoli and cauliflower florets and IQF carrots."

Denesting trays for Chinese meals

King Asia Foods, a producer of Chinese-style ready meals for the UK and Continental markets, has recently installed a Pneufeed tray denester from FP Packaging Machinery.

The FP Pneufeed is said to be well suited to the wet environments encountered in ready meal plants thanks to the specially-developed air jet system used to denest the trays.

King Asia Foods, which operates from a 50,000sq ft unit in Doncaster, was supplied with the FP Pneufeed as part of a fully automatic line for loading ready meal trays with curry sauce. The denester first deposits PET trays on to a queuing conveyor. A gating system then presents the trays for loading by King Asia's existing weigher, and a slatted



band conveyor transports the trays to further, downstream packaging operations.

The FP line can operate at speeds up to 45 trays a minute, with actual line speed dictated by the cycling time of the weigher.

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The Multi-Fill equipment is PLC-controlled, with a graphics screen on the operator panel that communicates clearly what the machine is doing. There are two operating modes, 'production' and 'clean', with the latter allowing "a quick wash-down of the filler between products," says Mr Lupton, to save time during product changeovers.

The MPF is designed to be fully mobile and can be positioned over simple tray conveyor lines as well as thermoforming equipment.

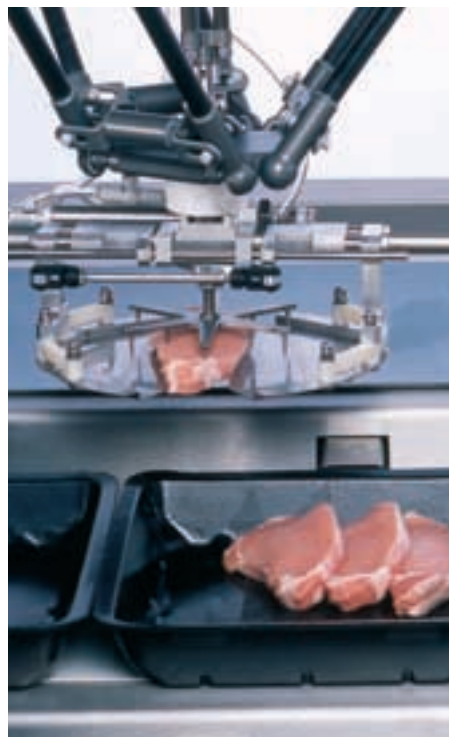
Not all ready meal ingredients can be either squeezed or dropped randomly into a tray, especially when they are 'centre of plate' items such as meat portions. One alternative to a line of human operators is to introduce robotics, since robots can, in theory, pick-and-place ingredients just as they already do whole packs or bottles in end-of-line applications.

But fresh or floppy food ingredients such as portions of chicken or stacks of bacon are clearly less consistent and compliant than bottles or boxes, which is why, according to one equipment supplier, robot applications in this area have been "startlingly ineffective" until recently.

Robot loading system

However, AEW Delford Systems appears to have made a significant leap forward with its RPLS – or Robot Portion Loading System – which will pick single, fresh or frozen, bone-in or boneless meat portions or sliced groups, like bacon or cooked meats, and place them straight into trays or thermoformers ready for packing.

The most obvious use for this system is in meat packaging plants, where cuts or slices can be taken straight from a portioning slicer or saw,



Accurate placement: Robot Portion Loading System from AEW Delford Systems

but the system can equally be linked to a conveyor delivering proteins to the ready meals line.

The company has worked closely with ABB of Sweden, a leading robot manufacturer, to create the RPLS system, which uses vision technology to accurately recognise the position and orientation of portions on the conveyor. This enables the machine's mechanical action gripper to lift, transfer and place the portioned product accurately into the tray or thermoformer. Up to six pick and place heads can be operated from a single vision and control system.

AEW Delford Systems has stressed that while the RPLS has been successfully demonstrated, "its potential and full ability have yet to be realised".

Meanwhile, Raque Food Systems points out

that ready meal manufacturers are under intense pressure to produce more meals from the minimum floorspace, and its aim therefore is to offer them high-speed operation without resorting to multiple machines.

Continuous motion for speed

One way to push up speeds is to use a continuous motion system, rather than indexed lines. "Intermittent machines have limitations due to their index and dwell ratios," says a Raque spokesman. "At speeds up to 300 containers a minute, continuous motion has been the key to solving many customers' problems."

In a typical turnkey system from Raque, multi-head rotary vacuum tray denesters feed containers to single or twin-lane flighted conveyors. A range of filling equipment can be used to deposit viscous or non-viscous liquids and IQF, blanched or dry products into containers. Travelling carriages, moving in either oscillating or box motion, ensure the filling heads are accurately located over the trays.

"This provides an extended fill time that far exceeds the industry average, to give clean, accurate deposits, and lends itself well to interfacing with multihead weighers to optimise product transfer," says Raque.

The carriage's horizontal and vertical motion offers "splash-free fills", and any adjustment to timing can be carried out on the run.

Filled trays are transferred via an overhead unit to Raque's drum heat seal machine, which is said to suit most flexible lidding materials. The drums do not need to be changed to accommodate different tray sizes while surplus film vacuum extraction is said to give the potential to reduce film wastage by up to 60 per cent compared with conventional profile cutting systems.

This system eliminates the need for a film rewind, which allows lower gauge film to be employed, which Raque says could mean further savings on film costs. A cantilevered die cutting head makes knife changing a slide-in/slide-out affair, and quick release tray carriers allow speedy product changes without use of tools.

At the end of the process, sealed containers can be fed direct to a freezer or, in the case of chilled meals, to a sleeve.

Another principal supplier of complete tray filling and sleeving packages is Italy's G Mondini, represented in the UK by D2 Food Systems. Over the past couple of years, Mondini's installations have included more than 50 high speed in-line tray sealers and lidders. And a number of these were supplied as complete



Quick changeover: Vision 400 tray sealer from Packaging Automation



Air-driven agitation: Riggs' new depositor with make-up conveyor

systems for tray denesting, depositing sauces, filling proteins and particulates, tray sealing and automatic sleeving.

In fact, they include what is said to be Europe's fastest and most-automated lasagne line, supplied to a top UK producer of frozen ready meals. This line can operate at up to 150 meals a minute, and can produce single and multi-portion sizes with varying number of sheets and different recipes.

Mondini tray sealers are said to be the only fully mechanical in-line sealers on the market. This system gives consistent sealing pressures of up to 6000kg and is said to offer long life and low-cost maintenance. Mondini's Evolution series of sealers now spans seven machines, from a 20-a-minute entry-level unit up to a high speed 150-a-minute system.

Not every manufacturer is looking for an all-embracing package of tray denesting, filling and sealing. Machines such as the Lincac series from Tecnovac of Italy can be added to a line purely to lid and seal trays and, where necessary, can include gas-flushing to extend the product's shelf-life.

Planet Flowline, which represents Tecnovac in the UK, recently supplied two Lincac 500s to New England Seafood in Wandsworth, London. These machines are manually fed with trays which require modified atmosphere packaging and operate at speeds up to 27 packs a minute in a three-lane format. Convergents at the discharge point organise the packs into single lanes for checkweighing and labelling.

Heat sealing is also the focus of Packaging Automation, the Cheshire-based supplier, which manufactures all its equipment in the UK. Models range from the semi-automatic rotary turntable PA182 to the more advanced Vision range of in-line machines.



Compact sealer: Proseal PR30 semi-automatic twin station rotary machine

Commercial manager Samantha Ashton sees the moves towards smaller batches and quicker turnaround as key drivers in the ready meals sector. She says PA has invested heavily to expand its range and to ensure its Vision machines are both faster in operation and quicker to switch between products.

Speed of changeover

"We believe speed of changeover is the vital element of heat sealing and lidding machinery," says Ms Ashton, "because of the demand for a bigger and better choice of ready meals. Some factories can be running a line for just minutes before a changeover. There can be multiple tool changes a day, so if you are not careful there is more downtime than running time. We are trying to make tool changes as quick, easy and efficient as possible."

The Vision 182 is PA's top selling – and also

most hired – automatic inline machine, designed for companies looking to automate labour-intensive semi-automatic packing lines on a limited budget. The larger Vision 4000 can seal larger and deeper trays at up to 100 packs a minute.

The company's latest development is the Vision 400, intended to plug the gap for a compact, budget tray sealer offering speeds up to 80 a minute. The design allows all fixings to be released by hand, so product changes can be achieved in two minutes. The Vision 400 is designed for integration with chain or flat-belt filling conveyors and can accept randomly spaced trays. It can seal plain or printed film, foil or board lids to any compatible container including cPET, aPET, aluminium foil, polypropylene, PVC and board.

A compact entry level tray sealer for ready meals and other fresh and long life food applications has been announced by Proseal.

A semi-automatic twin station rotary table machine, the PR30 is capable of sealing and perimeter trimming film lids onto a variety of pack materials including cPET, polypropylene, PVC, styrene, board and smooth walled foil at speeds up to 30 packs a minute. An in-board trimming option to cut the film inside the perimeter of the tray flange is also available.

A particular feature of the machine is Proseal's self-aligning, table damping system, which automatically slows down the top and bottom halves of the tool as they are locked into place prior to sealing. This is said to ensure the accuracy of alignment of the tools and create a consistently effective seal.

Sealpac has extended its tray sealing machinery range with the recent introduction of its flagship unit, the Sealpac 800, which incorporates a number of improvements.

These include intelligent tool recognition, a more efficient vacuum/gas operation for MAP packs, simplified cable-free tool change within ten minutes, guaranteed orientation on trays with flanged ears such as snack bowls, and a new design of sealing system to give higher pressure.

Single and twin lane systems are available to give speeds up to 160 packs a minute.

Sealpac machines also incorporate the inside film cut system which, says the company "produces the best pack presentation available today". Film costs are also reduced since film is cut before sealing to the precise shape and dimensions of the area to be covered. Peel tabs can be incorporated for easy opening.

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CHECKWEIGHING AND METAL DETECTION

Combination machine checks dishes for the hotel trade

Loxton Foods, an award-winning producer of restaurant-quality recipe dishes, is reported to have "greatly improved" its operations by the installation of a new checkweighing system.

The company, headed by chef Paul Durbin, needed to reduce the problems of overfilling of trays at its site in Stockport, Cheshire, where it makes meals for the hotel and pub sectors. So Loxton installed a Garvens CombiChecker, from Mettler Toledo, which combines a checkweigher and metal detector in a single unit, but



Dutch installation: Lock Met 30+ metal detectors at King Cuisine

has separate pushers so that product rejected as off-weight is separated from product contaminated by metal.

Mr Durbin explains: "We use the equipment for checking and weighing individual portion dishes in the assembly area, so it's vital the instruments we use are accurate and reliable. The checkweigher is easy to use, easy to clean, and has been successfully integrated into the existing production lines without any problems."

The CombiChecker offers central article data editing at the weighing terminal of the checkweigher. It can store up to 200 product settings and classify items in three weight zones.

The Safeline metal detector incorporated in the unit uses 'zero metal free zone' (ZMFZ) technology to allow mechanical integration with the checkweigher's infeed conveyor.

Dutch ready meals producer King Cuisine prefers to use stand-alone metal detectors at its factory in Udenhout, and has now installed eight Met 30+ machines from Lock Inspection Systems.

The diversity of King Cuisine's product portfolio – from salads and sandwich fillings to ready meals – creates particular inspection

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Labels in place of sleeves: Tray-fix applicator developed by Advanced Labelling Systems

challenges, since varying product signals, container sizes and packaging materials have to be taken into account. Lock says it recommended the Met 30+ detector because its proprietary ADC software is capable of achieving consistently high sensitivity in the face of these variables.

Fine tune the settings

ADC takes signals from the metal detector and displays them on screen in graphical format. The images allow the user to fine-tune the detector settings from a remote laptop to match the product being inspected which, says, Lock, means the tiniest contaminants can be detected, whatever the product or packaging.

The high moisture content of such fresh products poses further challenges because it can cause interference with the detector coil.

The Met 30+ has an 'automatic product compensation facility', whereby it records the profile of conductive products, then automatically tunes the detector to ignore the product itself and recognise the presence of unwanted contaminants.

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For example, cost was the driver behind the development of Tray-fix, a low-price solution combining a wraparound label with the machinery to apply it, developed by Advanced Labelling Systems (ALS).

Tray-fix is said to provide a robust alternative to traditional cardboard sleeves at a much reduced start-up cost, allowing smaller, specialist producers to compete with industry giants at around one-third the price of investing in a traditional board sleeving machine.

Four panel wraparound

With cost being a priority for all producers, however, one of ALS's most recent installations has been an inline Tray-fix machine for a major chilled meal manufacturer serving the high street multiples.

In this application, trays are loaded on to an infeed slat conveyor and the Tray-fix labeller automatically applies a four-panel wraparound self-adhesive card label with overlap, in any

position. Since the labels are perforated, the film lid can be peeled away during cooking, leaving cooking instructions and ingredient information still on the pack.

Recipe cards or other promotional material can be incorporated in the label, which is applied to food trays after they have been filled and sealed. This prevents any movement and also means the



Cross web labelling: Koch machines can now cover wider conveyors

sleeve cannot fall off during transit or be switched in-store by dishonest shoppers.

In the latest application, the manufacturer is achieving speeds of up to 30 packs a minute although up to 60 per minute is feasible – significantly faster and more cost effective than hand-loading sleeves, as ALS points out.

With more ready meal producers making use of multi-row tray sealers to increase throughput, labeller supplier Koch – represented in the UK by Atwell Self-Adhesive Labellers – has made minor modifications to its Cross Web machines to fit over the wider conveyors.

The modified units can now apply labels at speeds up to 120 a minute while the sealed or lidded tray is still held positively in the tray former. Die-cut paper or, more frequently, clear

SLEEVING, CARTONING, LABELLING

Labels now vie with sleeves for reduced cost of presentation

Full sleeves, cartons, bands, watchstraps, labels... as retailers look for more product variety on shelf, so the range of primary packs on the ready meals fixture increases. Sometimes the choice is about aesthetics; sometimes it's about cost. And, as usual, the packaging industry has responded with a choice of machines to suit all levels.



Banding alternative: *ATS machines operate with ultrasonic sealing systems*

pressure-sensitive labels can be applied accurately – the latter allowing the consumer to see the product in the pack.

The Koch Cross Web labeller uses an indexing belt to transfer and deposit one or more labels, via a vacuum box, onto the trays while the host machine is in the stationary, sealing phase of its cycle. There is also an option for the Koch unit to advance a pre-set pitch along the length of the tray sealer and apply additional rows of labels.

Built to IP65 standard

Each labeller can be produced to match the overall working width of the customer’s tray sealer, and hot foil or thermal transfer printers can be incorporated to add price, date, ingredients or bar codes. Important for ready meal applications, the labeller and its touch-screen control unit are built to IP65 standard to enable wash-down where required.

However, conventional board sleeves continue to dominate the market for chilled ready meals. Indeed, three years ago T Freemantle developed a continuous motion sleever for ready meals, using standard pre-glued five-crease sleeves, and it has since notched up over 35 installations, most of them for multiple machines.

The pre-glued sleever is designed for ease of operation and maintenance. The continuous-motion operation allows slower movement of the sleeve at high speeds, which, according to Freemantle, makes settings much less critical than on intermittent machines.

The sleever system has been employed running bands, watchstraps and full sleeves as well

as a variety of tray styles including oval and round bowls, multi-compartment trays, crimped and smooth wall foils and, most recently, piggyback twin-packs.

Multi-packs are also a particular focus for Paker, the French carton sleeving specialist represented in the UK by Integrapak. Paker’s speciality is collating filled packs, arranging them in the required configuration in either one, two or three layers, then wrapping them in a board sleeve that is glued for tightness.

An example that shows the potential of this system to the full is a recent ready meals installation for McCain’s in Australia. Here, the Paker machine is sleeving a range of three different diameter bowls, with and without handles, as well as two styles of rectangular tray and a 200mm plate, at speeds of 90 to 135 packs a minute.

Despite the complexity of the assembled pack, manual changeover on this machine can be achieved in less than four minutes – although a servo-assisted option is also available.

Wraparound models

The range of sleeving machines built in the UK by Adco Manufacturing includes both wrap-around models and machines to operate with pre-glued sleeves, both semi-automatic and automatic.

For example, the CS-80, the latest wrap-around machine, is able to wrap either full or part length sleeves around rectangular, oval or round trays and tubs at speeds up to 80 a minute. A lugless machine, it employs powered belts to index products arriving at random and has been designed for changeover in 5 minutes

with no need for tools. The machine is also particularly compact, occupying a floor space of 1.1 x 2.3 metres.

Adco equipment for pre-glued sleeves includes the entry level SEL-60 erector loader, a completely automatic continuous motion machine that sits in a footprint of just 1.5 x 1 metre and is capable of handling up to 60 trays a minute. Semi-automatic, hand-loaded machines include the 12PGS-100 capable of running at speeds of 20-100 items a minute.

Cost savings with banding

Banding is an alternative to sleeving that is popular on the Continent and is being pushed quite strongly in the UK. According to Swiss banding machine supplier ATS, represented in Britain by Jenton International, banding offers considerable cost savings as well being harder to tamper with.

“Sleeves are woefully expensive in material and manpower,” claims Erich Lohner, general manager, sales and marketing, at ATS. “And because they are a relatively loose fit, it’s easy for unscrupulous shoppers to swap a cheap product for an expensive one.”

For volume producers, he adds, banding requires fewer operators per machine. “Banding machines are standalone or fully-automated devices that are simple to operate, whereas sleeve erecting machines are far more complex and cost many thousands of pounds more. The tighter fit of a band also stifles any intent to deceive by would-be miscreants in stores.”

Mr Lohner says ATS normally estimates the payback time on a banding machine to be “a matter of months” and points out that banding material is “considerably less expensive” than sleeving.

ATS claims that band print quality is as good as litho, with up to six-colour printing available on both sides, ensuring that high resolution photographs can be reproduced accurately. It says that band widths of up to 100mm are wide enough to include all the usual graphics, logos, bar codes, recipes, regulatory information and other information found on most food packs. And variable information can be printed in-line. Sealing is with ultrasonics.

“Ultrasonics can work continuously in the cold, humid conditions typical of a food factory, producing odourless seals that do not burn the banding film, leave deposits, or damage or taint the product,” says Mr Lohner. “In comparison, sleeves require gluing, which is an added production headache.”

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CODING

Package coding management takes account of ingredients

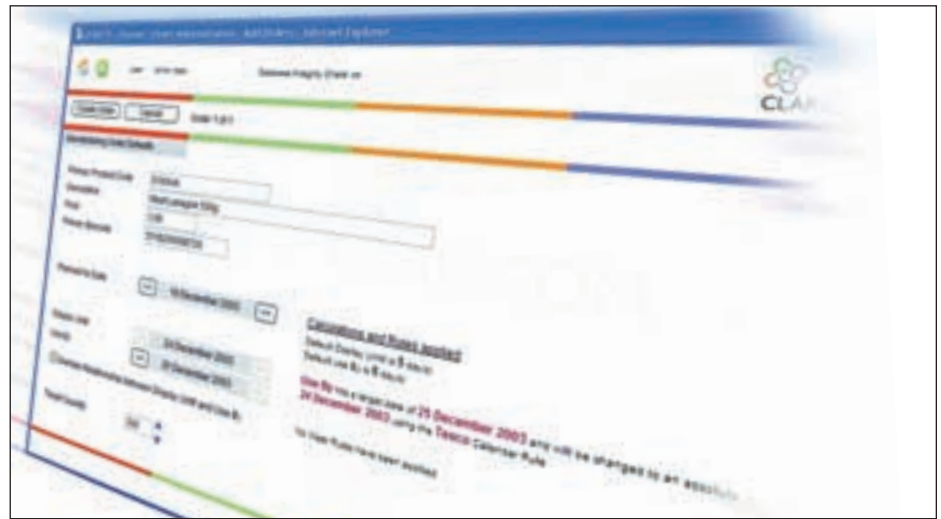
Coding management software that takes account of the life of different ingredients within products such as ready meals has been developed by Claricom to give security over the use-by date.

Generally, the company's Package Coding Management System (PCMS) operates on the principle that the prime cause of coding errors – manual data input – can be avoided using centrally-managed coding rules. These confirm the accuracy of information at source and, in an enterprise-wide Intranet, can be delivered directly to printers and coders, so bypassing operator entry.

However, the complexities of market sectors such as ready meals demand a more flexible solution in planning and implementation of coding data, as Claricom's technical director, Paul Lawlor, explains.

"Typically, a product's use-by date is based on the date of packing," he points out, "but once you combine ingredients into a ready meal, the criteria that determine the use-by date may be subject to change.

"This is especially true for ready-to-cook and pre-cooked meal types. Where there are fresh



Planning the code: Claricom CLARiFY system shows the calculations and rules applied

ingredients such as chicken, the product life is determined by the 'kill date'; similarly, in a pre-cooked meal, there may be one component – say, the sauce – whose 'cook date' determines the use-by life printed on the finished product.

"Manufacturers often survive on a mix of know-how, intuition and a variety of verbal or written instructions," he adds. "Yet relying on an operator to calculate the life based on the 'kill date', or to make sure they have the right number of days in the month, is an unnecessarily fallible system and costly errors are inevitable."

To this end, Claricom has created CLARiFY package coding planning software, specifically designed for operations where there are product and production specific variations to coding rules. As well as factors such as ingredients, the software is also able to control seasonal variations, product launches and promotions, where information is subject to short-term change.

Chilled savoury snacks manufacturer Pork Farms Bowyers is one company that has benefited from Claricom PCMS technology.

"The Claricom system is more sophisticated than alternative systems with, for example, an in-built calendar programmed with production dates and changes and even when Bank Holidays occur," explains Simon Almond, manufacturing systems manager. "All of this makes us much more efficient."

Hazlewood Chilled Meals also uses Claricom technology on its lines. "The use of a PCMS from Claricom has delivered proven benefits to the accuracy, flexibility and speed of our coding process," explains operations director Mark Lodge. "To protect the reputation of both the retailer and ourselves is undoubtedly an asset we would not be without."

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END-OF-LINE

Faster collating systems meet needs of high speed production

One simple measure of the ever-increasing popularity of convenience foods is the enormous increase in the production speeds of many new lines currently being developed. While 60 a minute was quite normal in recent years the speeds being requested now are even up to 250 packs a minute, according to German end-of-line equipment specialist Meurer.

As a result, points out UK agent Fords Packaging Systems, Meurer has concentrated on developing its high speed collation systems to handle cartons at speeds in excess of 250 a minute, and to be modular in design, making it possible to fit them to either a case-packer or a shrink/stretchwrapper.

Most of the ready meal projects involving Meurer end-off-line equipment have been for shrink/stretchwrapping. This, explains Fords Packaging, reflects the large number of recipes in most manufacturer's range, which makes it necessary to pack in small counts – usually six cartons – to allow all retail outlets to stock the entire range.

"Corrugated cases are too expensive for such small numbers, and the film wrapping provides large savings in comparison with the case costs," says Fords Packaging. "Very often the cost of the film wrap is less than the self adhesive tape needed to seal the case."

When wrapping carton collations at 40 or more a minute the length of the standard reels of shrink film will last barely one hour in production. So Meurer has also developed its



Pick-and-place: BluePrint HOP case-packer at Oriental foods handles 70 trays a minute

wrappers to handle reels up to 600mm diameter, to give non-stop production for five times longer than usual. Automatic splicing is also available.

Meanwhile, although Yamato is a name generally associated with weighing technology, the company has recently moved into end-of-line equipment with the introduction of the FCP 550V case-packer, which it describes as well suited to most ready meals projects. The machine can handle a variety of formats including trays, bags and rigid cartons, offering vertical or horizontal pack patterns.

Maximising use of volume

The FCP 550V controls packs from the in-feed conveyor, adjusts them to a vertical orientation, then groups them in rows before merging these into multiple layer patterns and delivering each layer to a case or tray. According to Yamato, the machine offers users greater control of tight case-packing operations and maximises the volume content of each pack to provide "significant material savings".

Thanks to a compact footprint, the machine could suit growing businesses or those with limited space as well as established producers looking for a high-volume packer.

Oriental Foods of Fakenham, Norfolk, and several ready meals producers in Germany, Belgium and France have chosen HOP automatic case packers from BluePrint Automation to pack retail outers. More than ten of these machines have been installed during the past 12 months.

According to BluePrint, the HOP's universal machine platform allows it to handle trays with or without sleeves, as well as pillow and block-

bottom bags. Meals are usually placed horizontally in the case, but a module can be added to allow it to pack vertically too.

BluePrint says versatility has been built in to the HOP machine because the ready meals sector is relatively young and product presentations are still changing.

The HOP installation at Oriental Foods, which is handling up to 70 trays a minute in various sizes, has three elements: a case packer, case erector and case closer. Trays arriving from the high care area are first checked for the presence of sleeves and any unsleeved meals are rejected. The others are then pre-collated according to the required packing pattern, picked up by a vacuum head and placed in the case. A free-standing case erector delivers cases to the packer on demand, and a top sealer closes the filled containers.

Food manufacturers looking for economic, entry-level monobloc case packers are being addressed by Mondo & Scaglione. Its new Impack machine, available in two variants, is said to be ideal for anyone moving into end-of-line automation for the first time.

Adapted to cartons

The machine is distributed in the UK by Wrapid Packaging Systems and was originally designed to pack bottles. However, Wrapid says it can easily be adapted to pack cartoned products such as ready meals, and adds: "The unit can pay for itself in the first 12 months of operation."

CAM is another Italian manufacturer able to provide complete ready meal packaging lines as a turnkey service, beginning with primary horizontal cartoners or sleeveers operating at up to 250 packs a minute. From there, explains UK

representative Campak, it offers a choice of stretch-banders or case-packers to suit different applications.

Its ASB38 stretch-bander differs from conventional systems in using only a single roll of LDPE, which means there is only one seal per pack. Rather than use a hot air shrink tunnel, it stretches the film tightly around the product's girth, then uses hot air guns to shrink the film on the side of the pack only.

Alternatively, it can offer top load or side load case-packers capable of speeds up to 20 cases a minute.

Another familiar name in case-packing, this time from the UK, is Endoline Machinery, whose array of equipment takes account of the fact that ready meal producers use a range of hand-operated, semi and fully-automatic systems for putting consumer packs into cartons or trays.

At the lower-volume end, one Endoline customer reduced operator numbers and improved efficiency by installing hand-packing stations on three manual sleeving lines.

Operator numbers halved

The feeding process, running at 30 packs a minute, is helped by the two-tier Endoline packing stations, which hold packaging consumables on one level and product on the other. By combining this system with a semi-automatic case former and taper, the customer halved the number of operators on each line.

On a further three higher speed lines, with automatic sleeveers, speeds of 60 packs a minute were being achieved. Endoline case erectors were installed to feed a hand-packing conveyor, with a fully automatic case taper at the far end. This reduced manning from four operators to 1.5 per line.

The first of these applications made use of Endoline's 100 Series case formers: simple machines with few moving parts, requiring no adjustment for different case sizes. The machine folds the lower flaps, then holds the box steady so packers have both hands free for filling. The second application uses the 200 Series case erector, which can erect both standard corrugated and plastic corrugated cases.

Meanwhile Europack has recently supplied two carton wrapping installations – both for Headlands Foods – designed to meet the specific handling needs of frozen ready meals.

At Headland's plant in Flint, North Wales, a 'tight wrapper' was designed to handle flat-laying cartons in a range of sizes, without using a conventional star wheel or using potentially

costly change parts. And at the food producer's recently built Grimsby plant, packing speeds of up to 120 units a minute have been achieved through the development of a high speed machine. Typically handling collations of six, nine and 12 across a range of formats, the Europack machine is equipped to handle around 25 different pack sizes.

Europack developed its 'tight wrapping' system some years ago to offer increased efficiency. Through the use of a special sealing jaw, it is said to use up to 15 per cent less film than conventional shrink-wrapping.

Europack sales director Ivan Reeve says cartons of frozen food present particular handling challenges. "Frost build-up can cause cartons to stick together, so it's important to ensure they are handled individually. Flexibility and quick changeover speeds are also important to support multiple changes within one shift."

Finally, AMJ Maters has announced the CP-300 a new, economy case-packer from Rembrandt Packaging. A compact machine, it combines case erecting with a pick-and-place loading arm that features a 'self-teach' mode to allow new packing configurations to be added in-house. Speed is up to ten cases a minute and changeover is said to take 5-6 minutes.

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Temperature check: Northern Foods now has eight Celsius systems from Loma Scientific

QUALITY CONTROL

Microwaves check temperature of chilled food at lower cost

Since the original R&D work on adapting microwave thermometry for the food industry began in 1995, Northern Foods has been working with Loma Scientific and the University of Glasgow to test a new non-contact temperature sensor on a range of chilled foods, including ready meals.

The result has been the launch of the Celsius temperature measurement system which, Loma says, looks set to bring new levels of accuracy and significant cost savings.

"As an organisation, we were concerned about the amount of products we were throwing away after temperature testing," explains Northern Foods group technical manager Richard Seaby.

"Our 30 sites across the UK produce hundreds of chilled product lines, so we were spending over £1 million each year on thermocouple probes. Our initial work with the University of Glasgow convinced us that microwave thermometry technology would provide the solution, so we chose Loma to develop a system for the marketplace.

"The new Celsius has brought new levels of accuracy to our testing procedures and has now

been adopted across nine of our operations where losses were greatest."

The new temperature-sensing device is designed to sense the temperature of chilled food packs accurately through the use of microwave thermometry, which eliminates the need for intrusive probes causing product wastage. Results are recorded electronically.

"Alternative technologies have significant margins for error which could result in serious food safety issues," explains Roy Salvidge, sales manager at Loma Scientific.

"For example, probes are only accurate to plus or minus half a degree Centigrade and only record temperature at the tip. We have developed Celsius to improve accuracy and food safety levels by testing the average temperature of the product. It gives readings within five seconds and is accurate to within plus or minus 0.2 of a degree Centigrade.

"Customers can also recoup capital outlay within months as the packs are still fully saleable after testing, unlike with other methods."

As well as improving the quality control process, the new system is also said to be capable of leading to overall energy efficiencies, allowing chillers to be kept at the most energy-efficient levels, without unnecessary wastage.

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For full details of all PPMA members able to supply equipment for ready meals, consult the PPMA machinery finder service, tel: 020 8773 8111, or visit www.ppma.co.uk