High speed pizza packing: *Part of a Bradman Lake cartoning line handling 800 portions a minute*

Robotics move upstream

THE DAYS WHEN ROBOTS WERE THE SOLE PRESERVE OF CASE PACKING AND PALLETISING ARE LONG PAST. SHORTER PAYBACK PERIODS COUPLED WITH TECHNICAL ADVANCES ARE DRIVING THE ADOPTION OF ROBOTS TO LINK UPSTREAM PROCESSES.

Robots are a familiar sight on case packing and palletising operations. But up until now their use upstream has been limited by a combination of cost and technical complexity. However, all the indications are that this is changing rapidly.

For example, packaging machinery supplier Bradman Lake has observed two principal areas of dynamism further up the line. The first is the use of robots to link the end of the processing stage with primary wrapping – whether a flow-wrapper or a cartoner. "What we're finding is that people are using robots to pick up product coming off the belt and place it in the infeed of the flow-wrapper," says Simon Wheatley, Bradman Lake group sales director. He cites the example of frozen beefburgers, which typically come off the belt randomly at high speed in large volumes and need to be sorted and loaded into the flow-wrapper.

The second area is using robots to transfer unwrapped product into an end-load cartoner. Again, this involves replacing the long infeed of the end-load cartoner with a short infeed and a robot.

Both are operations that have traditionally often been carried out manually because, as Simon Wheatley points out: "People are very good at dealing with random situations because they have the unique ability to see what is in front of them and decide what to do with it. Robots aren't very good at that because they are used to being told where to go, what to pick up, where to put it and when to go back again."

However, the shift towards robots for such applications is occurring, he explains, because robots are now smart enough to look at 'what's coming down the pipe' and make a decision based on a number of parameters. This, he adds, is a result of improvements in vision system reliability and processing power.

"Vision by definition is a hugely PC intensive

activity,'' Simon Wheatley explains. ''You're taking a picture, making decisions based on a set of matched criteria and telling the robot what to do. That takes fairly chunky processing power from a PC or PLC.

''What has happened is that PCs have become more powerful and, at the same time, the price of processing power has come down. This has made vision technology more cost effective for complicated applications that would previously have just been hopelessly expensive – and hopelessly unreliable.''

Also, robots themselves are becoming better suited to packing tasks, he says. ''Robot providers are starting to see packaging as a dynamic market and are investing time and effort in developing products specifically for that market, rather than asking us to use robots which are great for automotive but not so good for packaging.''

Creating 'bumper packs': *Sewtec multipacker at Fox's uses two ABB FlexPicker robots for transfer duties*

Progress in gripper solutions, meanwhile, is bringing applications which were previously considered too tricky as a viable economic option into the realm of possibility.

Dave Bradford, managing director of robotics integrator RTS Flexible Systems, is able to give examples of gripper technology that have helped the company build a library of gripper solutions.

Most recently, RTS developed a gripper for transferring pancakes without touching the product. Instead, a device pushes air out of a special chamber around a ring shape. This creates a pull in the centre – or a 'doughnut of air' – which causes the pancake to lift off the conveyor.

Another application that required a combination of vision technology, high speed robotics and a fresh approach to grippers was a system RTS designed for a poppadom producer.

The irregular size and shape and the brittleness of poppadoms makes them difficult to handle without cracking. So RTS conceived a solution that picks the poppadoms as they are coming out of the fryer at a rate of 400 pieces a minute, then deposits them in groups of six or eight in a Multivac machine. Key to the system is the patented gripper design, which picks up the poppadoms without contact by allowing them to be sucked into a chamber.

While the adoption of robotics has traditionally been measured in terms of payback periods through labour savings, Mr Bradford says that in the past few years, the increases in output afforded by robotics have become a much more interesting and persuasive economic argument.

''We looked at an automation project for a seafood manufacturer which cost £900,000 and enabled it to increase output by £750,000 a year. Measuring the saving in terms of labour costs would have meant a much longer payback period.''

Moving further downstream, a second area that has come under the spotlight in recent years is the space between primary and secondary packing. While the use of robots to load flow-wrapped product into cartons is not in itself a new application, what has changed in the last couple of years is the take-up of this technology.

''Many more companies are now finding there is a return based on using that technology today,'' says Bradman Lake's Simon Wheatley, ''whereas one or two years ago they looked at it and said it was too expensive.''

Greater flexibility

Squeezing greater flexibility out of robots is also a prime objective of companies who are buying robots for linking primary and secondary packaging machinery. ''It's not just that the number of applications in which companies are using robots to load products into cartons is increasing, it's also about maximising the duty cycle of the robot and getting it to work harder,'' explains Mr Wheatley.

Bradman Lake, for example, has come up with ways of loading into cartons and flow-wraps off the same robot by using dual outfeeds, so the robot is packing into a carton one minute and into a flow-wrap multipack the next.

David Marshall, business development manager, robotics, with ABB – the company that pioneered picking robotics with its FlexPicker robot – says he has seen a number of cases where the FlexPicker is being deployed to link the flow-wrapping and cartoning processes.

Indeed, two ABB IRB 340 FlexPicker robots form part of a multi-pack autofeed system installed last January at Fox's Biscuits' Kirkham site in Lancashire.

The confectionery manufacturer was relying on manual labour to transfer multipacks of Rocky and Classic biscuits into a flow-wrapping machine to create a 'bumper pack'. However, following an audit of the manual operation, the company's management realised that automating the operation offered scope for increases in efficiency and reductions in cost.

Fox's commissioned Sewtec Automation to develop a system which had to be easy to use with a foolproof control system, capable of automatically balancing the speed of the two independent product infeeds with the existing rate of product outfeed, and able to provide payback within two years.

Sewtec designed a system comprising two servo-driven, vertical racetrack collators, two slat band conveyors, a Siemens-based control system and two ABB IRB 340 FlexPicker robots, which are used to transfer the stacked multipacks from the slat conveyors into the flow-wrapper infeed. Only one operator is needed to oversee the new system, whereas four operators were needed for the previous manual operation.

''The Sewtec system is a well thought out and effective solution, which meets the demands of the application in every way,'' says Paul Fisher, engineering project manager at Fox's. ''Though the application could have been met with a non-

robotic solution, the concept of using ABB FlexPicker robots means that through their excellent application versatility, they can be readily redeployed anywhere in the factory, which certainly adds to flexibility."

While the use of robots in case packing and palletising operations is well established, incremental technological improvements are still being made.

ABB, for example, launched a new second generation robotic palletiser at Interpack last year, which it claims has a longer reach and faster cycle time than its predecessor. Called the IRB 660, the machine combines a 3.15 metre reach with a 250kg payload. The robot's four-axis design means it can track a moving conveyor, so users can palletise cases without stopping the line, while its long reach means it can service up to four infeed conveyors, two pallet stacks, one slip-sheet stack and four palletising outfeed lines.

Palletising might be a 'solved problem', but depalletising is more complex, according to Barry Millin, general manager at systems integrator Robotic Solutions. "Putting boxes onto pallets is something anyone can do. Taking them off is more difficult as you don't always know what is on the pallet."

With this in mind, the company has designed several systems for depalletising boxes and crates which use vision technology.

Looking to the future, the expansion of robots into previously uncharted processing and packing applications looks set to continue. In addition, advances in vision technology could mean robotic systems making decisions based on ever more complex parameters.

For further information:

ABB
T: 01908 350300
E: david.marshall@gb.abb.com

Bradman Lake
T: 0117 971 5228
E: cartoningsales@bradmanlake.com

Robotic Solutions
T: 01884 840209
E: sales@robosol.co.uk

RTS Flexible Systems
T: 0161 777 2000
E: flexible.info@rts-group.com

Sewtec Automation
T: 01924 494047
E: sales@sewtec.co.uk

PALLETISING

Robots bring progress all round

Chronos Richardson has worked with Kawasaki Robot to develop its Chrono-Pal RP robot palletiser for bags, pouches, drums, cartons and cases.The palletiser is said to occupy minimum space and offer the flexibility to cope with different product formats in one palletising process. Operating speeds up to 1000 packs an hour can be achieved.

It incorporates a gripper with in-built controls allowing it to switch between different pack sizes.

However, while robot palletisers are often championed for the flexibility and ability to overlap bag edges and palletise onto non-standard pallet sizes, Chronos Richardson is quick to point out that they are not the panacea for every palletising problem. In fact, the company says that when cost and flexibility benefits are fully analysed, traditional palletisers can be just as economic.

This was the reason why Chronos Richardson developed a hybrid palletiser called the Chrono-Pal Compact palletiser, which draws on the best features of both types of palletiser. It combines the layer forming and side compression benefits of traditional high level palletisers with the innovative bag gripper designs of a robotic palletiser.

While the ability to overlap bag edges is a useful feature of a robot palletiser when bags are well filled, if they have been poorly filled it can lead to unstable pallets. The Compact palletiser eliminates this problem by allowing layer compression and lateral layer pressing techniques to be employed, stabilising the load to give pallets that can be stacked higher if required.

Drawing on the experience of Italian palletising company Zecchetti, Planet Flowline can deliver robotic palletising systems for transferring shrinkwrapped packs, cartons, multipacks and individual containers from infeed to pallet. The company has just completed an installation at Amcor's factory in Gresford, Wrexham, in which unstable empty PET bottles are being transferred automatically from the discharge of blow moulders onto pallets.

The system collates a range of containers coming from the blow moulder, picks and places them two rows at a time on the pallet and stabilises them. The robot also automatically picks and places tier sheets and top frames. Empty pallets are automatically fed into the system by the conveyor system and full pallets are discharged through an integrated strapping machine.

Planet Flowline says it is currently working on more sophisticated designs of robot palletisers where the robot handles the empty pallet, tier sheet, containers and top frames – reducing the cost of the installation and minimising the floorspace required.

Italian packaging machinery group OPM, represented by Hansel UK, has developed a new generation of modular frame mounted heavy duty robots with vision-driven grippers. A plastic tray or display case loading, lidding and palletising line is an example of how the robots can be used.

The system has a capacity of 12 to 37 display cases a minute and six plastic trays a minute. It can accommodate tray sizes of 144 x 232mm to 400 x 600mm and changeovers are said to take just a few minutes.

Palletising: *Chronos Richardson Chrono-Pal RP machine*

Vacuum formed trays of product are scanned by a vision system on their way to the packaging system. Acceptable product is then picked individually by the robots and placed into either a display case or a plastic tray. The display cases are held on a special servo-driven step chain that tilts the case to receive the product standing upright, while the plastic trays are loaded flat. Plastic trays are then sent directly to the palletiser, while display cases are delivered to a robotic lidding module, which forms the lids and folds and glues them around the trays.

The OPM Samas palletiser has a single