

Cartoning machinery moves Beyond the box

CARTONING MACHINES THAT ALLOW NEW SHAPES AND FORMATS – SUCH AS TAPERED PACKS AND WALLETS FOR PHARMACEUTICALS – ARE BRINGING NEW HORIZONS TO A MARKET THAT WAS ONCE SIMPLY RECTANGULAR BOXES, WRITES MARTIN KEAY.

The criticism often levelled at cartons by pack designers and brand managers is that they are almost always rectangles and that it is very difficult to give a product packed in a carton a distinctive shape that can become synonymous with the brand.

Of course, as we are regularly reminded at Easter time, it is possible to come up with very fancy shapes made from cartonboard, but all too frequently these distinctive shapes can only be erected, loaded and closed by hand and so for high volume production the tendency is to go back to the boring rectangle.

But this situation is slowly changing thanks to some innovative machine designs that allow different shapes of pack to be formed filled and sealed completely automatically.

Blister wallets

For instance in the pharmaceutical industry instead of placing blister packs of tablets in rectangular end-load cartons, there is a growing trend to pack the blister in a cartonboard wallet.

This has a number of advantages, not least being that it reduces the cost of packaging. However there are also benefits in pack functionality.

With the conventional end-load carton pack, the blister very quickly becomes separated from the carton and the instruction leaflet, but with a wallet pack it is possible to glue the blister to the wallet so that important consumer information, such as dosage instructions, remains attached to the product.

And of course with a wallet pack it is possible to make the shape of the pack unique and distinctive, which in the pharmaceutical industry is important not only for commercial reasons but also to prevent any risk of confusion between different medications.

One recent example is a Schubert TLM-F2 line installed at a German pharmaceutical manufacturer to load blisters of tablets into dispensing

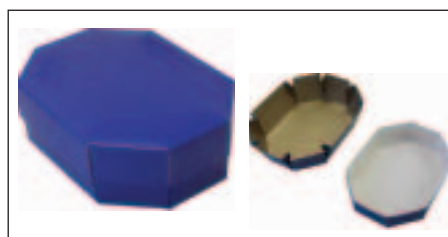


Wallet loader: Tablet blisters are glued into carton strips by the Schubert TLM-F2 line

wallets at the rate of 240 packs a minute. This method not only means format re-setting is simple and fast but also allows a variety of different wallet designs to be processed on the same machine.

"A growing number of pharmaceutical manufacturers are choosing to pack their tablets in carton strips. It is not only a very economical way of lowering packaging material consumption but also has benefits for the consumer," explains Alan Law, managing director at Schubert UK. "As the tablet blister pack is sealed within a wallet, it ensures that important consumer information such as dosage instructions remain attached to the product."

Blister packs are first fed into the compact



Tray sealed by lid: Mohrbach presentation tray uses no adhesive or tuck flaps

Schubert machine from a high-capacity product buffer capable of storing up to 8 minutes' worth of production.

They then enter a rapid thermoforming and sealing section which glues the blister packs into carton strips. These strips are then folded around the packs by specially-designed, quick-change tools. In the final stage, the machine applies a sealing label and laser imprint to the wallets.

Fancy carton shapes

When it comes to producing unusually shaped cartons the most common machine for the job is the classic carton erector, which forms the packs from a flat blank, usually with the help of male and female mandrels, securing the flaps either with tuck features or glue.

However German manufacturer Mohrbach, represented in the UK by Integrapak, has come up with an interesting variation – an automated system to produce a tray that is neither glued nor secured with tuck flaps, but is simply held together by the top lid. This means that when the customer opens the package the base carton springs open to reveal the contents.

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The line consists of a tray erecting machine, an intermittent motion conveyor to carry the tray to a multihead weigher able to load a mix of products, and a lidding machine. Lids are secured with two labels.

Different shapes of sleeves

The growth of chilled foods and ready meals has increased the demand for cartonboard sleeves. Here again sleeves used to be basically rectangular, but a wide variety of shapes are now being used to give products a distinctive appearance in this very fashion conscious sector of the food industry.

Traditionally, sleeves have been supplied pre-glued, which allows them to be placed on the pack either manually or by machine. However, an increasing number of customers are purchasing wraparound sleeving machines which apply the sleeve in the form of a flat blank around the product, securing it with either hot melt adhesive or a tuck feature.

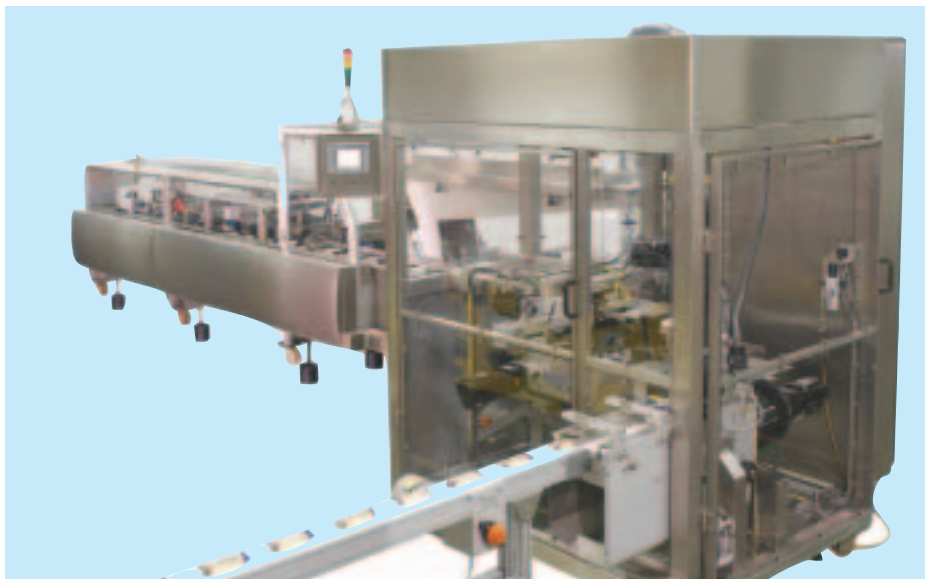
The advantage of wraparound sleeving machines is that they can be set up to handle the more unusual shapes of sleeve as well as conventional rectangular sleeves.

For example, with Kliklok Woodman's Certi-wrap machines – the C80 capable of up to 80 sleeves a minute, and the C150, giving up to 150 a minute – round bowls, oval bowls and rectangular-shaped containers can be handled on the same machine. Single or multi-pack tubs, trays, or pots can be sleeved and the machines are also able to accommodate tray doming, where the film lid of a ready meal tray unintentionally expands in production.

However, Kliklok Woodman says that the principal reason for the success of the Certiwrap range of machines is its quick change capabilities. In the past, a three dimensional size change took some 40 minutes, but with this new system the company says it guarantees a three dimensional change in 15 minutes – less than 10 minutes with an experienced operator.

In addition to giving products a distinctive appearance, wraparound sleeves are also frequently used to hold groups of products together both in the dairy industry for products such as yoghurt and in the bottling industry for take-home packs of beer and soft drinks.

Last year Krones introduced the Solidpac multipacker which assembles cans, glass, or plastic containers in single or double-row formation, and folds a flat cartonboard blank around them. Various configurations are available – such as over-neck, or neck through – while output ranges



Packing cereal bars in New Zealand: Bradman Lake automated racetrack and end load cartoner

between 80 and 250 packs a minute, depending on the size of the multipacks involved.

Rectangular cartons

However, while there is a noticeable trend to developing machines that can produce shapes of pack other than rectangular, the fact remains that the vast majority of cartons are rectangular and are likely to remain so. The choice of machine types has remained much the same for several decades although, of course, in recent years we have seen increasing use of servo motors and software synchronisation of different machine modules.

End load cartoners are the preferred choice for products that are easy to load and for their compactness, vertical cartoners are ideal for free-flowing products and carton erector and top load systems are often the only solution for collations of products or products that are difficult to load.

End load cartoners

Even so, the development of new technology in the form of the servo racetrack collator or servo train is allowing groups of products such as frozen fish fingers or cereal bars to be packed on end-load cartoners rather than in top load systems.

This has several benefits: end-load cartons are cheaper than three-flap top load cartons and using one machine rather than three or more in a top load system reduces cost, the footprint of the equipment and manning levels.

Dutch manufacturer Langenpac is soon to deliver its first two cartoning lines for frozen fish fingers to a German food processor. These lines, built in stainless steel to a hygienic design will

collate groups of naked fish fingers introduced to the system at 850 a minute.

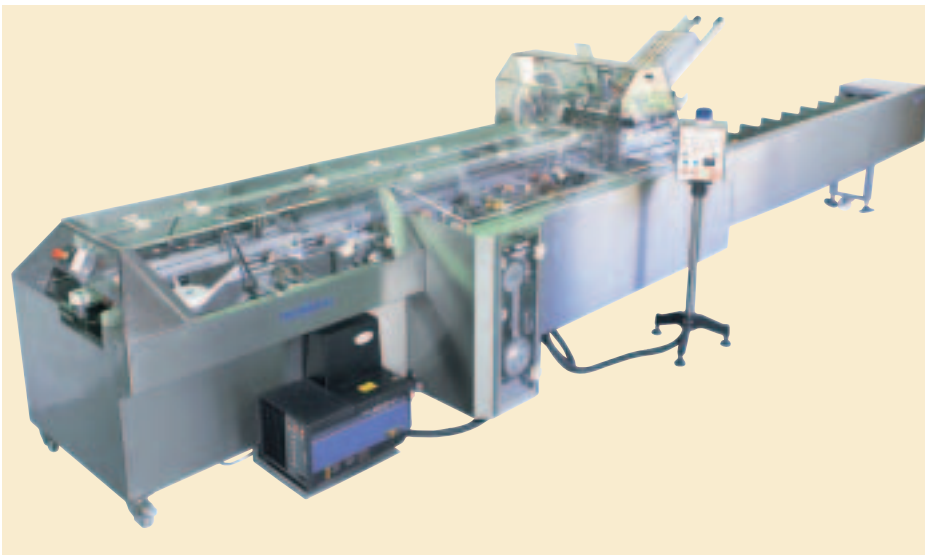
A triple servo driven race track system equipped with stainless steel buckets collects the pre-collated products in intermittent motion. Once filled to the required count, each bucket moves off to synchronise with the continuous motion of the cartoner, bringing the fish fingers in front of the pushers for carton loading.

UK representative Springvale Equipment points out that the use of three servo trains, rather than the more standard two, allows a slower, smoother movement, while retaining the high output of the machine – up to 170 cartons a minute.

Bradman Lake has recently supplied a New Zealand food manufacturer with an automated system for flow-wrapping, collating and end-load cartoning confectionery bars. "End load cartoning delivers high-speed packing line performance with lower machinery costs than robotic top load systems, with the added bonus of considerable savings of packaging materials and factory space," says Bradman Lake.

The integrated installation combines a single station Automatic Distribution System (ADS) with in-line bar turning and shuttle phase feeder and a Flowtronic 120 flow-wrapper from Autowrappers with a Bradman Lake twin race-track collator/loader and SL902 indexing end load cartoner.

In operation, cereal bars 80 to 110mm long, 40mm wide and 20mm deep reach the ADS system in rows of 10, 12 or 14, narrow edge leading, at the rate of 19, 22 or 26 rows a minute and are fed in single file into the pockets of the twin racetrack SL902. Here they are packed as single



Increasing speed: California Cake Co has bought a Freeman end loader with integrated product transfer



Special shapes: Tapered cartons are among those handled by the Kliklok SFR machine

pieces or multiple counts of 6, 8 and 12 at speeds up to 250 bars a minute, although an option exists to increase speed to 310 a minute.

Cartons from a motorised magazine are erected by a triple-head rotary feeder and loaded into the pocketed infeed conveyor of the indexing SL902 by a compact overhead pusher unit, also servo-driven and triple-headed. The bars are then loaded into the erected cartons during the stationary phase of the cycle by a second overhead pusher, replacing the extended barrel loader of many continuous motion end loaders.

However, with or without a servo racetrack or servo train, end load cartoners remain the workhorse of the cartoning world.

For example, IWKA now has a range of end-load machines extending from 50 to 500 cartons a minute and recently introduced a compact intermittent motion model that links directly to a blister packer and is able to run at speeds up to 165 cartons a minute – said to be 50-65 per cent

faster than traditional intermittent machines.

Measuring just 3.8 metres long, the new Cartopac SI 10 will also handle products similar in shape to a blister, such as sachets, wound dressings and small vials.

The key to the speed of the machine is the use of linear motors for the pre-insertion and loading stroke that pushes both product and leaflet into the carton, as Derek Moore, managing director at UK subsidiary IWK PacSystems, explains:

“Linear motors allow the pushers to be given a distance, acceleration and speed profile to obtain the best output with any particular product, rather than rely on fixed, cam driven movements.

“This means, for example, that the pushers need only move the distance required by the product and can be retracted at a much higher speed, shortening the cycle. The result is a cartoning speed up to 165 a minute against the more common 100-110 a minute maximum for traditional intermittent machines.”

The speed of the linear motor drive for the pushers on the Cartopac SI 10 also means that the machine is able to approach the output of the lower end of continuous motion end load cartoning equipment without the cost and space requirements of a barrel loader. Size range on the Cartopac SI 10 is 30 x 12 x 65mm to 100 x 100 x 150mm.

IWKA has also started to specialise in turnkey project management where, on many occasions, the cost of the cartoner is maybe as little as 10 per cent the cost of the line.

“This is because more and more customers are looking for an experienced and substantial company that can act as main contractor, design the line, source the equipment and, most important, give a single performance guarantee,” says Derek Moore. “IWKA will also usually assemble the line within its own factory for initial acceptance.”

One recent contract involved a complete packing line for four sizes of vials, including a particularly lightweight 2ml version. The cartoner chosen was a continuous motion IWK SC4 HS equipped with leaflet feeder, ink jet printer for the main flap, packaging security scanners, a quality control station in which a pre-selected number of good packs are discharged for manual inspection, an OCV system to verify variable data added by ink jet, and a tamper evident labeller that applies a label to both ends of the carton.

Immediately behind the cartoner is a checkweigher to ensure on a 100 per cent basis that the cartons are complete. Upstream is a 450-a-minute labeller, hot foil printer, verification system for print and reject systems to handle faulty or fallen vials. A rotary table acts as a buffer and interface with the cartoner. Downstream is a bundler/overwrapper. All were sourced by IWKA.

The California Cake Co, Coatbridge, has increased speed and efficiency following the replacement of its existing cartoners with a fully automatic 120-a-minute machine from T Freeman, installed on the company’s cake slice line. “The method of size change and the compactness of the machine were key in our decision,” says California Cakes general manager Keith Bell.

The machine is fitted with the Pinlock size change system which incorporates simple mechanical registration of carton settings and is supplied colour coded for tool-free changeover by the operator. Freeman says the accuracy of the system helps reduce downtime during size change as well as offering a huge reduction in carton wastage.

Kliklok’s most popular end load cartoner is the SFR which, says the company, offers a short footprint and easy size change features, together with the adaptability to accommodate a variety of products from bagged confectionery to frozen ready meals.

Indeed, a number of special shaped cartons, including hexagonal, octagonal and tapered styles have been handled on this and other Kliklok end load models. For example, a specialist chocolate manufacturer in France chose the Kliklok SFR to pack bags of truffles into a high quality tapered carton while, at Cadbury Trebor Bassett in Sheffield, bags of Liquorice Allsorts and Wine Gums are being loaded into tapered cartons at speeds up to 120 a minute

Frozen food producer Findus has also installed an SFR cartoner on its ready meals line at Longbenton. Trays of 500g and 900g are fed at random onto the SFR’s integrated ‘smartbelt’ infeed

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unit which pitches each tray correctly to ensure smooth and accurate transfer before loading at speeds up to 120 cartons a minute.

Meanwhile, Italian manufacturer Cama has built an electronic end load cartoner to handle sachets of dried food in two pack styles at speeds up to 200 a minute. Products arrive in two lanes and are handled as a stacked count of three to four or on edge in a 10-12 count.

Both intermittent and continuous motion end load machines with speeds up to 250 cartons a minute are built by Dutch manufacturer Racupack, represented by Hansel UK. The latest is the RTI C40 Compact, a small footprint, entry level machine able to run at speeds up to 40 cartons a minute, with automatic carton loading from a hand fed, flighted infeed conveyor.

Another new development, currently being undertaken for a UK customer, is a version of the RTI 80 intermittent motion machine, to handle wraparound carton blanks. This allows the machine to handle more difficult and unstable product collations.

Top load systems

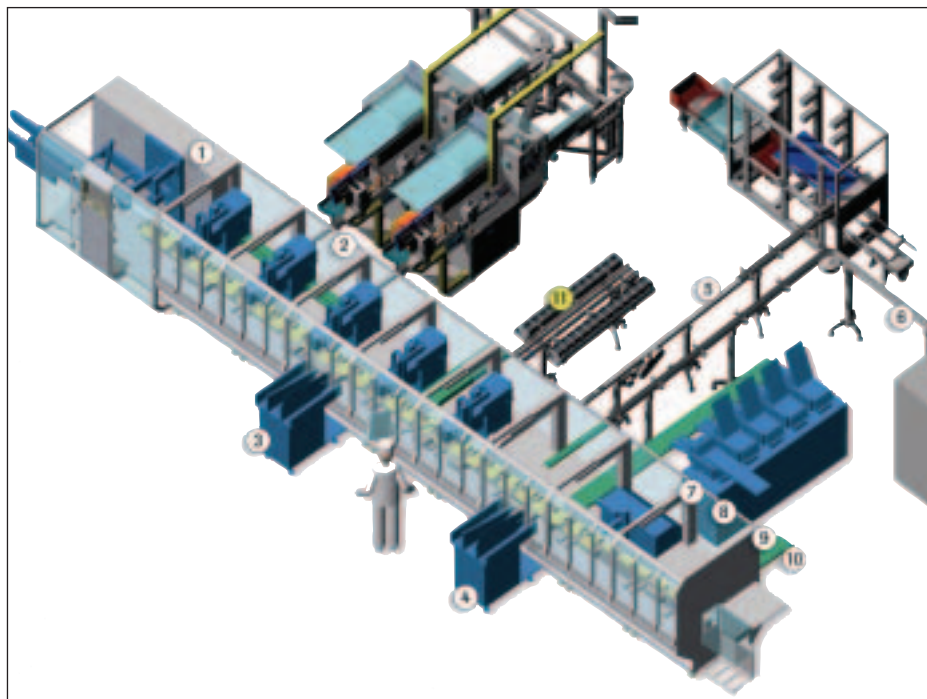
Top load cartoning systems with their separate carton erection, carton loading and carton closing machines or modules, while more complex than end-load cartoners are often the only way of automating a complex cartoning operation.

For instance, a current trend in the pharmaceutical industry is to supply combination packs containing several different types of products, often for a specific treatment such as carrying out blood analysis, doctor's packs or packs for self-medication. The packs will combine products such as blisters, ampoules, bottles, pipettes, syringes or tubes, as well as spoons, leaflets and pack inlays, either next to or on top of one another.

Forming and sealing these packs can be carried using conventional carton erectors and closers, but filling such a wide variety of products into the same carton poses some significant technical challenges.

The answer from German manufacturer Uhlmann is the TopLoader T2060, a modular machine introduced two years ago to meet a variety of top load applications within the pharmaceutical and medical device industries. Uhlmann is now building one for US manufacturer Biosite, to handle a blood analysis kit containing 25 separate strip packs, 25 pipettes in a carton, a roll of paper, an electronic EPROM module as well as five pack inserts and brochures.

The machine consists of nine modules and can



Uhlmann TopLoader for Biosite: 1: Carton erection. 2: Strip packs loaded. 3: Carton divider insert added. 4: Paper roll loaded. 5: Pipette carton loaded. 6: EPROM chip loaded. 7: Literature inserted. 8: Carton closed. 9: Checkweighing. 10: Carton overprinting. 11: Tray feeder for alternative pack

be subsequently equipped with further modules or components to suit future demands. Changeover times are said to be short – which suits Biosite's small batch production programme – with only a few format parts. There are six steps in the packaging process:

Step 1: The strip packs are supplied in plastic transport boxes and placed manually onto the conveyor, where they are subsequently separated. Each strip pack contains a test strip for a patient's blood sample, [which is analysed in a portable meter]. Each of these strip packs has its own serial number so it is unique and easily identifiable. Variable data, such as the use-by date, is also printed on each strip pack in the TopLoader. Verification of which data belong to which strip pack, is undertaken by the machine.

Step 2: An inlay is inserted and accurately glued in the box. It divides the box and ensures that all the separate products are correctly and stably positioned in the pack.

Step 3: The pipettes are not inserted individually but in cartons of 25. These cartons are supplied in a case. The feeding unit takes one carton of pipettes at a time and places it in the pack.

Step 4: The paper roll for documentation of the results of a point-of-care blood analysis is supplied and placed in its designated position.

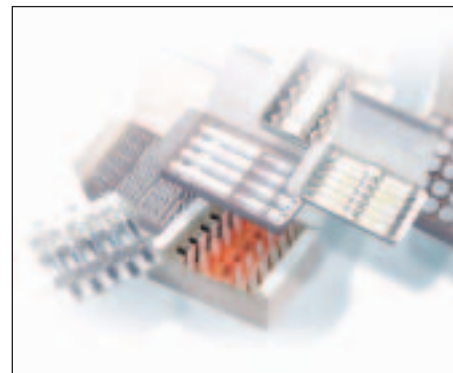
Step 5: The EPROM module, packed in a clamshell, is supplied. This read-only memory module is necessary for calibration of the meter for the point-of-care blood analysis.

Step 6: The five pack inserts and brochures are supplied. A 100 per cent check is carried out using a bar code scanner.

Top load cartons are also proving popular for sterile products such as, vials, ampoules and pre-filled syringes. Not only is it simple to remove each syringe and instruction leaflets thanks to the wide top opening, but the number left in the pack is immediately apparent and the inside of the lid provides extra space for printing instructions and product information.

Dividella, part of Koerber Medipak, offers a number of machines that are able to erect and fill top-load cartons incorporating fluted trays to secure the items in position. These include the new Dividella Neotop 804, which forms the cartons and trays from flat blanks, gluing the fluted tray into position ready for loading.

Integrated inserters load the items into the carton along with any leaflets and each carton is then checked to ensure everything is in place before closure using hot melt adhesive to provide a tamper evident seal. This machine can handle up to 240 cartons and up to 800 individual items a minute.



Fluted trays: Dividella Neotop erects and fills trays with products such as vials and syringes

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Loading different size packs and packs with different contents into the same carton is a job usually nowadays best left to robots. For example, Italian manufacturer Cama has recently supplied a top load cartoning line with three robots to load sachets of different flavours of cake mix powder together with bags of chocolate chips and other toppings.

Each of the three robot loading stations is linked to a bagging machine and can operate at speeds up to 70 cycles a minute. Cama says that the particular benefits of the line include a small footprint and quick changeover with various types of product and sizes programmed from the operator panel.

Recent top load cartoning projects by Kliklok Woodman have included two lines for Nestlé France, to handle wrapped chocolate Lion Bars in a three-flap charlotte style, lock erected and hot-melt closed carton. Speed is up to 120 cartons a minute, with two sizes per line.

The lines each use a Kliklok SRW double headed forming machine to lock form two cartons at each stroke, depositing them into a flighted conveyor. These machines are interfaced with an existing automatic loading system which places the bars in the required count into the erected cartons. After filling, the cartons are closed using the Kliklok Mini Genesis closer, a small footprint machine able to handle cartons arriving at random.

Kliklok Woodman's latest carton closing innovation is the Vari-Right, a three-flap right angle machine that brings together lugged carton control and random infeed timing as a result of infinitely variable flight centres. Like the Genesis lugless closer, the Vari-Right accepts random, unevenly spaced cartons. But once the cartons enter the machine, they are controlled positively throughout the closing process by variable pitch, pop-up lugs. Speeds is up to 120 a minute.

Kliklok Woodman has also introduced new



Robotic trio: Cama system loads three components of various cake mixes

versions of its ECT glue formers, with the latest machines able to handle blanks up to 1000mm square. Apart from conventional top load cartons and trays, the ECT forming machines are also able to handle special shaped constructions for the confectionery industry with an additional separate "mortar board" gluing attachment.

Sewtec Automation has supplied Twinings at North Shields with three top load, four flap carton sealing machines to handle a new carton for black tea products which incorporates a new inner carton with an additional flap to seal the carton across its front.

The machines were designed to operate with both the previous type of cartons and the new, so that a phased introduction of new packaging could be carried out.

Each carton closer is downstream of a tea bagging machine, running at 2000 bags a minute, which drops the teabags into the inner, four flap carton. Closure is via flap kickers, guides, hot melt glue application and pneumatic top flap closure while nominal speed is 40 cartons a minute, with a maximum speed of 55 a minute.

Twinings' project engineer Paul Robertson

says: "Since their introduction, the Sewtec carton closers have reduced waste significantly and added to the flexibility of black tea packaging operations ... It's a special purpose machine, with a small footprint, and ideally suited for the limited available space on the factory floor.

"We are planning to introduce a further three Sewtec carton closers into our operation in the very near future."

Bradman Lake has announced a new robotic top load machine, the LJ/SRT, aimed in particular at automating the labour-intensive task of manually collating and loading bags of frozen chicken pieces, fish fillets and other prepared foods into cartons.

A pick-and-place unit fitted with multiple vacuum heads handles filled bags weighing up to 1kg at speeds up to 350 a minute, as standard loading up to 24 bags on each cycle. Bags are collated and delivered to the pick-and-place head by a vertical racetrack collar.

Latest news from Racupack is that the company has just bought the designs, patents and rights to manufacture the Compact C90 Compact carton closer from Nampak UK (formerly MY Cartons). This machine, capable of closing



Handling bags of frozen food: Bradman Lake has announced a new robotic top loading machine

at speeds up to 200 cartons a minute, complements Racupack's own range of vertical carton erectors, the RBE-45 and RBE-90.

Vertical cartoners

Vertical cartoners, which use the same style of carton as an end-load cartoner, but handle the carton vertically rather than horizontally, continue to be popular for handling free-flowing products such as rice, porridge oats or loose tea – packed directly into the carton or within a bag in the carton, the so-called bag-in-box carton.

Bag-in box cartoning can be carried out in two main ways using a vertical form-fill-seal machine and an end-load cartoner or a vertical cartoner.

There are significant advantages in terms of seal quality and containment of the product of filling the bags using a vertical form fill and seal machine, but on the down side the product does not settle very quickly and so the bag and therefore box end up being much bigger than a bag-in-box produced on a vertical cartoner.

Since this tends to give the consumer an impression of poor value for money as well as wasting cartoning materials, case-packing materials and shipping space, Rovema has now come up with a new machine that incorporates a vibration station to allow product that requires settling to be packed at high speed.

The CMV machine incorporates one or more bagging machines which load cartons with open top bags, loose filled to typically 110 per cent of carton volume. As the cartons are taken round the machine the product is vibrated and settled to around 90 per cent carton volume before the bag is lifted proud of the carton top for sealing.

At this point air is evacuated mechanically from the over-sized bags, excess material is trimmed off, and the bag allowed to drop back down into the carton before it, too, is sealed. ■

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Lean manufacturing cuts the cost of new machines

Two new horizontal cartoners were launched in May by Dutch manufacturer Langenpac, part of Molins Packaging Machinery, following a value engineering exercise by the company to reduce the cost of cartoning machinery through a reduced number of components and shorter build times.

Both were introduced during a series of open days at Langenpac's factory in Wijchen where further machines under construction for specific applications, including paper tissues, contact lenses and spirits bottles at high speed were also on display. In the UK Langenpac is represented by Springvale Equipment.

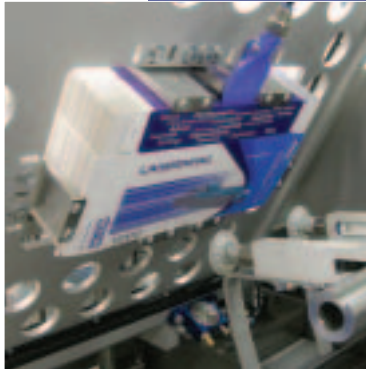
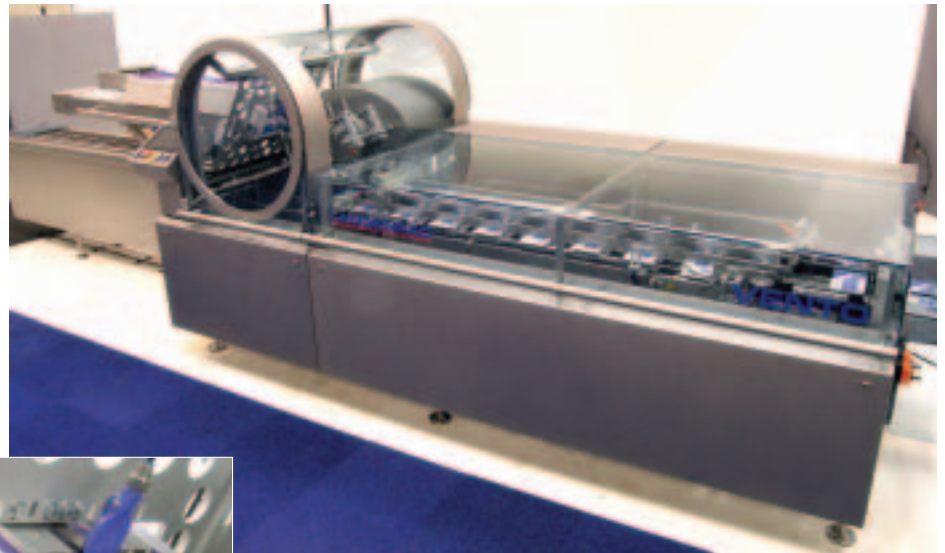
The new continuous motion Vento, 200-500 cartons a minute, and the intermittent motion Breeze, 60-80 a minute, share a common frame and are a cost-down development from the Langenpac Chinook cartoner launched in 2001.

"The Chinook had around 1300 parts, which was a substantial reduction on most machines of the time," explains Langenpac managing director Kees van Dam. "Our two new machines have some 25 per cent fewer parts than that."

"Lean manufacturing is a vital part of what we are doing in MPM," adds Molins Packaging Machinery managing director Adam Robson. "We are designing for lower cost. A manually loaded cartoning machine for under €50,000 is coming."

Both new machines are based on a frame that consists of cabinets front and back, housing the drives and the controls, joined in an open construction that removes opportunity for dirt traps and allows any product and packaging debris to fall through to the floor. This provides separation of the drives from the product area while maintaining accessibility for maintenance.

Size changeover on both machines is said to be 5-10 minutes, using digital lead screws and a pre-sized template for the carton magazine. On the high speed Vento both the product buckets and carton chain are driven by a single servo motor, reducing changeover time and the number of machine components required. Both machines employ pre-stretched chains, eliminating drift and need for regular adjustment.



Langenpac Vento: Fewer parts and (left) quick change carton blank template

an ac motor powered belt, and employs vibration to help settle the blanks against the carton template at the end of the magazine. An air knife makes sure each blank separates as it is picked up by the rotary feeder and placed in the carton support lugs.

With two sets of grippers the Vento's feeder is able to handle 200 cartons a minute although five can be fitted to give speeds up to 500 a minute within the maximum linear machine speed of 70 metres a minute and a pitch of 4.5in. Carton pre-break is standard.

Carton and product chains are fully supported on plastic extrusions for high speed and reduced noise while the pushers of the barrel loader – equipped with quick change heads – are also carried on extra supports to eliminate vibration.

Intermittent motion

The intermittent motion Breeze machine is to be available in 7, 5 or 15in pitch versions. It differs mainly from the Vento in the pusher arrangement, which is intermittent and driven either by pneumatics or a servo motor, and in the transfer bucket mechanism, which is mechanically driven. Parallel or angled infeed is possible.

Langenpac also took the opportunity to show off several machines under construction.

The largest were a pair of horizontal cartoners, each able to load spirits bottles arriving vertically at speeds of 300 a minute, and said to need just 12 minutes for size changeover.

In operation, a screw feeder first pitches the bottles, which are then gripped by the neck and placed horizontally in the bucket feeder for load-

ing into the cartons. These are erected on a high speed five head rotary feeder with a special double pre-break system. Closure is via a folding lock system at the base and tuck-in flaps at the top.

A particular feature of these lines is automatic loading of the magazines from trays of carton blanks simply placed on infeed conveyors.

After loading with bottles, the cartons are inspected for correct closure before being returned to vertical by the upender mechanism. Any cartons with open flaps are allowed to continue horizontally onto a reject table.

Another purpose built machine was a cartoning line for contact lenses with fully automatic unloading of the five cavity blisters from bulk trays and a series of laser printers to add product codes to the top and bottom of the blisters. Speed is up to 300 blisters or 50 cartons a minute.

The main feature of the machine is its flexibility. This comes from the use of a pick-and-place unit which allows blisters fed into the product chain at optimum speed to be transferred subsequently from one pocket to another and so re-stacked and nested on the move to suit the carton size. In this way, the machine is able to produce a single blister pack, a 15-pack of three blisters, a 30-pack from a single stack of three sets of two nested blisters and a 90-pack of three stacks of three sets of two nested blisters.

Further machines on show included a Langenpac Chinook cartoner equipped with a special infeed, folding knife and servo driven overhead compression unit to handle stacks of face tissues. These are loaded into conventional flat cartons or "boutique" cube-shaped cartons, using the folding knife to produce a U-shape for the product before loading. Speed is up to 200 cartons a minute.

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