Shorter production runs put Versatility first

CONTINUED EXPANSION IN THE CONTRACT AND GENERIC DRUG SECTORS HAS INCREASED DEMAND FOR SHORT-RUN, VERSATILE BLISTER PACKAGING MACHINERY.

Servo controls that keep sealing time constant regardless of machine speed, and reciprocating carriages to give an extended D-cam motion for platen style tools are just two ways in which blister packaging machinery manufacturers have responded to calls for higher efficiency in short runs within the pharmaceutical industry.

The first absolves users from carrying out a series of validation procedures at different speeds to establish the optimum speed for a different product, while the second allows continuous motion and hence higher web speeds using flat tools.

Indeed, if the feed characteristics of the tablets should change, either during the batch or from batch to batch, then the constant sealing time feature also means that the output of the blister packer can be raised or lowered without losing validation.

When shorter runs only involve cartoning or labelling – rather than the blister pack itself – recent developments also include late stage customisation systems to allow high speed blister machinery to be kept employed efficiently on much longer runs.

Moves to a greater proportion of contract, and to some degree generic production, with frequent demand for short-order solutions have, of course, fuelled the drive to make short runs pay.

Ultimately this comes down to the ability to cope with a variety of substrates, rapid changeover, reduced downtime and ease of validation, so that short runs to meet just-in-time ordering become viable. At the same time contract packers can then begin to offer short runs on a truly commercial basis, rather than as fill-in contracts to keep machines occupied.

For example, Steve Kemp, business development director at Brecon Pharmaceuticals, believes the role of the packaging services provider has changed significantly in recent years.

"It's not so long ago that the contract sector was viewed merely as a cost-effective way of dealing with products which were perhaps not the most important or profitable in a company's range," he says. "Today, as far as much of our business is concerned, quite the reverse is true – many of our customers are asking us to pack key products, or to handle complex jobs demanding a high level of skill. Our customers are rightly focusing on their key competences of product development and production; our key competence is packaging, so that as partners, we complement each other perfectly.

Latest line: *Brecon Pharmaceuticals' new Noack 623 blister packer and Promatic 4200 cartoner*

Adaptable equipment

"Personnel skills and training are of course essential but we do rely on equipment that is adaptable to market demands. Last year, for example, we were the first UK company to install a Pill-protect system to ensure compliance with BS8404 child-resistance legislation. We also need to be able to accommodate a wide range of batch sizes – on the one hand, many small batches for delivery to different markets, while on the other, we can expect longer runs as customers use outsourcing strategically."

The company is the largest user of platen-sealing Noacks in the UK, with four 760s and six 623s supplied by Romaco, and is also one of the biggest success stories in its sector. Having increased turnover by a factor of six in just five years, Brecon was last year acquired by AmerisourceBergen, one of the world's largest pharmaceutical services companies.

Indeed, according to Romaco UK managing director David Dixon, changes in the market and the resulting shifts in production patterns have been key factors in Noack's sales growth in recent years.

"Noack has always advocated flexibility and high equipment utilisation over the headline measure of blisters per minute," he explains. "A decade ago that meant that there was a significant proportion of the market that did not look for flexibility first – companies were running larger batches and often had the luxury of dedicated lines so that changeover times were almost irrelevant. Lines could stand idle for days or even weeks at a time.

"However, with consolidation across the industry comes increasing competition from the internal market and the result is that all produc-

Continuous motion: *Reciprocating carriage carries the heating panel and tools on Uhlmann's Blister Express*

ers now have to maximise utilisation of every line: idle equipment is simply not an option in today's highly competitive market.

High utilisation will win

"The drive to smaller batches and shorter delivery times to satisfy customer and market demands dictates that flexibility, with high equipment utilisation, will win hands down over the simple potential for throughput speed."

Quality, regulatory and customer expections have undoubtedly added to the complexity of operations at Brecon Pharmaceuticals.

Among challenges outlined by operations director Andrew Billington are increased demand for more complex base materials and cold form packs, more mixed fill packs with as many as five different products per blister, and greater rigor in the range of process measurement tests required, including enhanced validation requirements, leak integrity testing and even measurement for consistency in the thickness of blister pocket walls.

"Significant investment in technology and increased automation has helped us to address many of these requirements," he explains. "Machines now have a battery of detection devices – high product sensors, eject verification, splice detection, Pharmacode reading and so on. We have fitted colour cameras as standard on all new lines to ensure product integrity and have also installed a Hapa printer so that we can offer on or offline printing of blister foils, a more and more common request.

"Minimising changeover and cleaning times is essential to profitability, particularly as we generally have to strip machines down much further at batch end to comply with more rigorous cleaning and cleaning verification procedures. GMP-compliant design of blister machines and quick change features are therefore essential."

One way of cutting downtime is to integrate a cartoner with the blister machine under a single control system. This ensures compatibility and allows data to be extracted from one source, which makes record keeping and diagnostics that much simpler. It also eliminates the requirement for a blister magazine to transfer the blisters to the cartoner, since feeding is continuous.

Indeed, eliminating the job of manually restocking magazines reduces downtime further and removes a potential source of misfeeds.

Said to be the fastest single lane blister line in the world, Uhlmann's latest integrated blister line, the Blister Express Centre 500 operates at speeds up to 500 blisters a minute – 20 metres a minute web speed – and requires just 20 minutes for a full three-dimensional size change.

Small batch efficiency

Made up of a B1550 thermoformer, MultiTab feeder and C2504 cartoner, the line continues the Blister Express concept launched initially by Uhlmann at Interpack in 1999 for high efficiency in particularly small batches, this time offering enhanced efficiency for batches in the range 30,000 to 150,000 blisters.

A continuous motion machine, the B1550 nevertheless avoids the cost of rotary tooling by using platen-style stations that move with the web in a D-cam motion for thermoforming, coding, perforation and cutting. This means that tool sizes are relatively small, lower cost and easy to handle for changeover.

The machine also shares the new frame construction pioneered in 2005 by Uhlmann for its ultra-high speed B1880 thermoformer, which is based on a frame cast from mineral reinforced polymer, rather than the conventional welded steel.

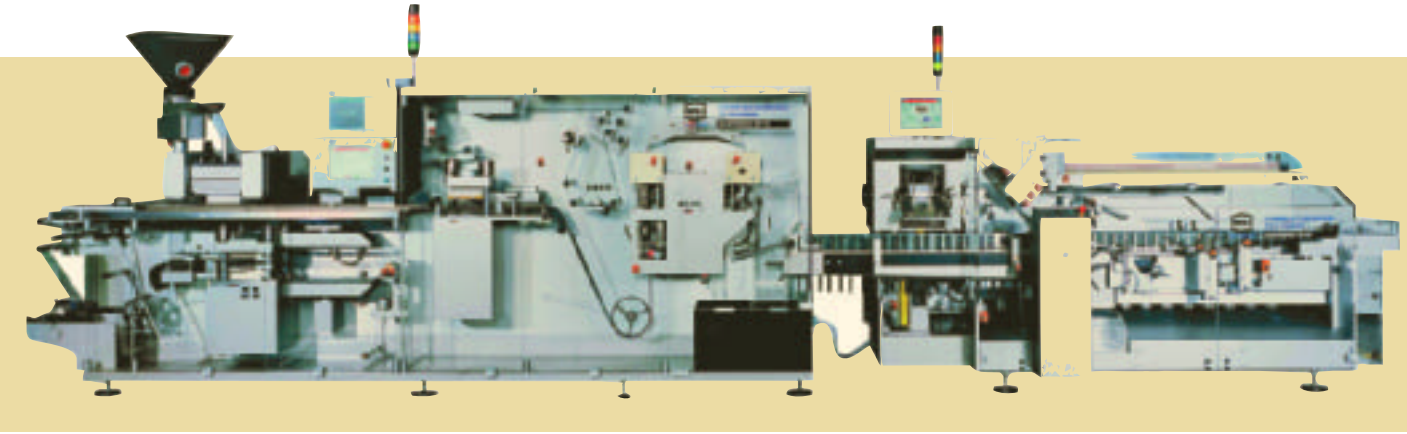
The result is a monolithic construction that absorbs vibration and creates a particularly quiet, stable base for the working parts. In addition, the casting process is able to include built-in channels for air and cooling water, eliminating some pipework.

The combination of continuous motion with operating heads that track the web in a D-cam motion starts with the heating section where Uhlmann has introduced a near infra-red heating panel that operates without contact with the film.

This is mounted above the forming tools, running on a reciprocating carriage with film temperature monitored to within ± 5 deg C via an infra-red pyrometer. Before entering the heating station the film is taken through an ionised air jet curtain to eliminate static and remove any dust with vacuum.

A dual reelholder for the forming film, with a flying splice for continuous running, is included within the machine footprint under the filling section, rather than as an external item, reducing floorspace and cost.

For feeding, Uhlmann has developed the new MultiTab station specifically for the BEC 500



Short to medium runs: *IWK Blisterpac BP 10 (left) is integrated to the Cartopac SI 10 intermittent motion cartoner in a line just 7.8 metres long*

line. Tablets are fed down the channels of a vibratory feeder onto a series of format plates that index to the rear of the web, for handling by a multi sucker pick-and-place plate which synchronises with the web motion via a linear servo motor drive.

Tablets are picked on individual suction heads able to handle shingling products and also accept up to 0.5mm thickness variation in the product. This avoids misfeeds and potential reject packs said to be common with these products in other feeders.

Prior to sealing by a rotary system, the blisters are inspected for correct fill. Also, throughout the multiple stroke area, the web is indexed continuously to avoid tension. Perforating, coding and punching are carried out by individually driven and positioned floating stations, to assure the accuracy of the process. However, only good blisters are punched and accepted positively upwards into the in-line feed to the transfer mechanism for the cartoner. Any reject blisters are simply left in the web and allowed to continue through the punching station and are then cropped into a reject bin.

In this way, points out Uhlmann, the reject blisters not only have quite a different appearance from good blisters, but for added security will also usually not fit in the carton.

Blister placement into the continuous motion cartoner infeed is via a series of platforms on a reciprocating beam that tracks the movement of the cartoner's product chain.

This servo driven cartoner, with push button size change, is equipped with a new mounting arrangement for the leaflet feeder which, for ease of maintenance, can slide completely clear from the rear of the machine. A checkweigher module is also integrated in the cartoner's outfeed to cross check that cartons are correctly filled.

A compact mid-range blister packing line, which can be changed over – including cleaning – in less than an hour, has been launched in the British Isles by IWKA PacSystems, the UK subsidiary of German manufacturer IWK Verpackungstechnik.

Measuring just 7.8 metres long, the line consists of two servo driven machines, the BP 10 blister packer – available with either intermittent platen or continuous rotary sealing – and the Cartopac intermittent motion SI 10 cartoner, linked by a direct blister transfer mechanism. Speed is up to 330 blisters and 165 cartons a minute.

"The new line is aimed at short to medium run blister packing where regular changeover is required," explains Derek Moore, managing director at IWKA PacSystems. "Including cleaning this takes less than an hour although the purely mechanical changeover can be achieved in under 20 minutes."

Constant sealing time

Servo drive and intelligent controls on the BP 10 blister packer keep sealing time constant during speed changes, so reducing substantially the cost of validation and downtime for changeover. The machine is part of a range that also includes the BP20, based on the same concept and capable of 600 blisters a minute.

The SI 10 cartoner is equipped with linear motors on the product/leaflet pre-insertion and loading stroke, allowing distances and retraction speeds to be matched to the product, reducing cycle times.

"Overall the result is a cartoning speed up to 165 a minute against the more common 60-100 a minute maximum for traditional intermittent motion cartoning machines," says Derek Moore. "This is approaching the speed of continuous motion cartoners, but without the cost and space requirements of a barrel loader."

Romaco's first integrated line was launched last year and is now in operation at a European contract packer. The T6 series initially consists of a 600 a minute Noack 9000 blister machine coupled to a continuous motion Promatic PC 4000 cartoner capable of 200 or 300 cartons a minute.

According to Romaco the Noack 9000 stands apart from other recent launches in this market in that it is billed as "the machine for every challenge" and "addresses widely diverging requirements with a single machine concept".

The modular design enables users to specify their sealing method of choice – platen or rotary – while retaining commonality of parts, servicing and operation across different models in the range. Additionally, says Romaco, existing Noack users will benefit from the compatibility of format tooling between their existing 600, 760 and 900 series machines.

Key features of the 9000 range include open-standard XML communications, which allows a high level of integration with downstream and ancillary equipment, and fast changeover aided by feeding systems that are readily exchanged.

IMA's latest mid-speed integrated line is the continuous motion C80-A81 capable of 400 blisters and 250 cartons a minute. Particular attention has been given to speed of size changeover and machine cleaning, says the company, while only one operator is needed for the whole line.

A single central microprocessor capable of storing all size data controls both the C80 blister machine and the integrated cartoner while a computer system is also optionally available to provide specific production statistics and trouble-shooting facilities.

The C80 blister machine is also available in a standalone version with a speed of up to 600 blisters a minute – on three lanes – and can be linked with all existing cartoners and wallet machines.

Brazilian manufacturer IWKA Fabrima has introduced the Blisterflex Hi-Pro low cost medium output thermoformer aimed at both

conventional tablet blisters as well as vials.

In particular, the deeper draw available from the machine compared to most blister-packers – some 25mm compared with the more usual 12mm – allows vials and syringes to be handled on the same machine as tablets and capsules.

Speed is up to 60 cycles a minute while the forming area is 230mm wide with an index of 110mm. All the usual materials can be handled including cold form alu/alu.

To reduce cost, the machine is driven by a mix of conventional AC frequency controlled drives and servo motors, which are used on the web advance for indexing accuracy, as well as to maintain smoothness. Format parts are said to be easily handled for changeover without tools.

In addition, says IWKA Fabrima, the new Hi-Pro can run tools made originally for a popular medium format thermoforming machine from another principal European manufacturer.

Output is up to 200 blisters a minute and the machine can be linked to a low cost IWKA Fabrima cartoner or, for higher speeds, the IWKA range of SC cartoners.

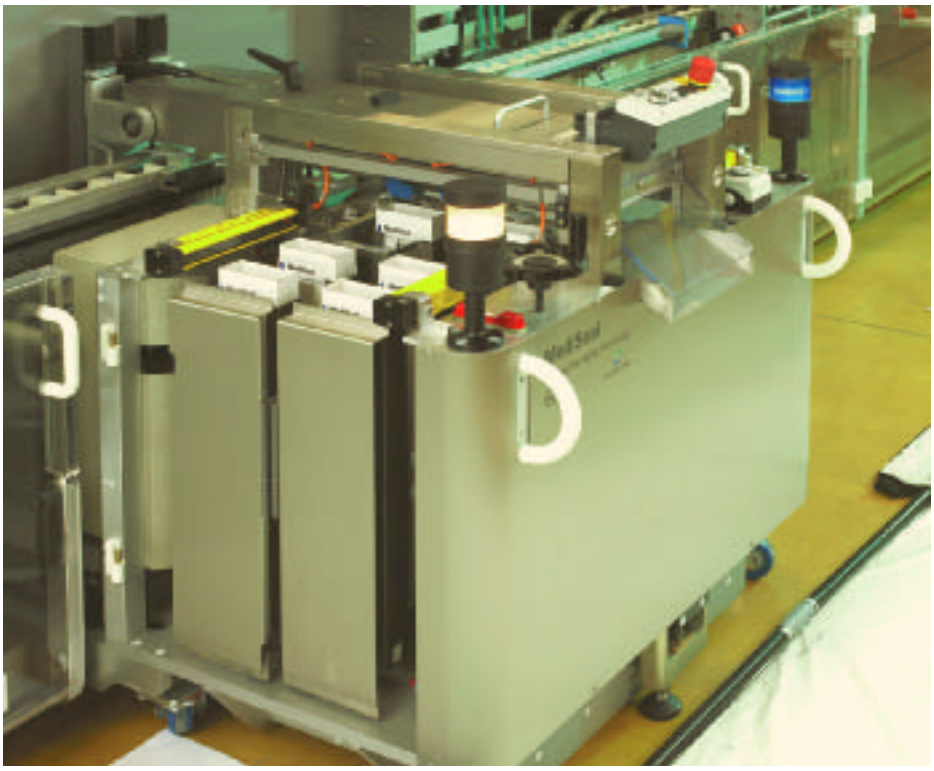
The range of servo driven blister machines from MediSeal, part of Koerber Medipak, now extends to machines with outputs of 800 blisters a minute, including integrated lines with intermittent motion cartoners to handle up to 300 cartons a minute.

Platen and rotary sealing together

All except the largest machine in the range, the platen sealing CP 1200, can be built with a choice of platen or roller sealing. However, the MediSeal CP200 incorporates both methods of sealing in a single machine, the only one of its type in the world says Koerber Medipak, providing a flexible basis for development work and sidestepping debate on the most appropriate sealing method for a particular blister.

The range of servo driven machines is complemented by a range of classical shaft driven thermoformers, said to provide cost effective thermoforming for parenteral as well as for solid dose products. Bridging the technologies is the recently introduced CP500 that provides relatively deep draws of 25-30mm for pre-filled syringes, vials and the like.

Most recently, Mediseal has announced the CP400e blister machine claimed to offer "an unbeatably attractive price/performance ratio". This single lane blister packing line – nominal output up to 400 blisters a minute – is said to be particularly flexible, with modular construction allowing it to be customised to meet any customer requirement. Thanks to the use of the latest servo drives, format changes can be carried out in less than 30 minutes.



Late stage customisation: *Mobile BIB-BOB system from MediSeal stores blisters in board cassettes*

When short runs only involve cartoning – rather than making the blister pack itself – late stage customisation systems allow high speed blister machinery to be kept employed efficiently on long runs.

The MediSeal BIB-BOB system– blisters into box - blisters out of box – was exhibited in the UK for the first time at the PPMA Show 2005 and operates with blisters from a high speed thermoformer fed into cassettes for short-run printing and cartoning on separate machines.

It allows very small, country specific packaging lots to be combined for blister packaging, typically improving machine utilisation by 30 per cent, according to simulated trials run by MediSeal, using actual production data.

At the heart of the system is the BIB-BOB module, a mobile storage unit that automatically removes the blisters from the thermoformer and stacks them in corrugated board cassettes holding 75-100.

Depending on production requirements, these cassettes can be removed from the module for separate storage, or kept in the module, which is then wheeled away and used to feed a standalone cartoner, typically a low speed intermittent motion machine. Customer specific information can be added to the blisters by a printing system on the blister machine itself or immediately prior to cartoning.

Last year MediSeal also announced a new security arrangment for the BIB-BOB system, based on a 2D code applied within the blister packer to identify the blister to separate printing and packaging processes.

Another method of late stage customisation has been developed by Pago, using print-apply labelling to supply language specific packs in low volumes.

The PagoLSC system also includes a leaflet feeder and clear plastic outsert label in which the leaflet is attached to the pack and accessed by the patient using perforations in the label. Packaging security is via a vision system that reads 2D matrix codes printed on the generic carton, the leaflet and label.

Also included in the system is a range of print and database software. Label text is controlled by validated checks that cannot be altered in the

Compact machines

Machines in the Korean-built Hoonga range of blister packers and cartoners, now available in the UK and Ireland through Logic TPS, are said to be compact for their output and also, priced in $US, to offer particularly good value for money.

Typical of the range are the HM200R and HM400R, which both feature balcony construction, are controlled by an industrial PC with a colour touchscreen and can handle a full range of plastic materials as well as cold form aluminium.

Despite an output of 200 blisters a minute the HM200R is only 2.5 metres long, and the 400-a-minute HM400R is just 200mm longer.

packing cell. GMP quality systems audit print clarity, and report individual job and order compliance.

Bespoke feeding systems

As solid dose products have become more complex so the variety of blister pack layouts has continued to grow – for example chevron shaped formats that allow more product to be packed in one blister or packs that incorporate two or more different products. Indeed, according to tablet and capsule feeding systems manufacturer Electro-mec (Reading) the number of product shapes has also increased dramatically – from standard round bi-convex tablets to flat or elliptical and multi-faceted shapes, some of which can be brittle or fragile and prone to chipping or breaking if not handled correctly.

The result, says the company, is a marked increase in bespoke project work. At its simplest this involves feeding different products simultaneously into one blister pack and Electro-mec has installed multiple sets of its EMF feeders over a single blister forming machine or created split hoppers to allow multi-product feeding from a single feeder.

The EMF feeders employ individual feed tubes that accurately place each tablet or capsule into the blister form. This precise placement, says the company, ensures minimal misfills, even for shallower cold-formed blister packs, and eliminates the risk of tablets shingling or chipping during the filling process.

Specially-designed pack layouts handled recently have also included a 'looped cycle' layout where the first dose has to be isolated. The blister form for this dose is therefore placed on its own at a right angle to the other two lines of capsules to enable the first dose to be effectively highlighted.

Electro-mec has also introduced its Orbital Brush aimed in particular at handling tablets and capsules whose shape and size can prevent them lying flat or flush within the blister form. Current solutions include rotary and static brushes but, points out the company, rotary action can sometimes draw product out of the pockets while a static brush may not be able to reach all affected tablets.

Instead, the Orbital Brush pad is lowered towards the web to a position where it just touches any protruding tablets and is simultaneously swept through 360deg while keeping the pad parallel to the web. The direction of the pad is then reversed and at the end of this cycle the pad is lifted back to its starting position.

Minimum changeover

To provide maximum flexibility and enable a variety of different products to be handled on the same feeder with minimum changeover time, Electro-mec has also developed a special EMF Feeder with an interchangeable feed system.

This allows the traditional feeder tube layout of the EMF to be removed and a flood box with paddles to be inserted in its place. In this way, easy-to-handle product shapes, which find their own way into blister forms, can be handled with maximum throughput, while individual placement is available for more awkwardly shaped capsules and tablets.

Recent installations of the EMF Feeder include one in which blister packer filling speed have been lifted by over 20 per cent, lifting throughput from 35-40 packs a minute to almost 50.

provide high output

Compact: *Hoonga HM400R runs at 400 a minute*

Changeovers for both machines, says Logic TPS, are 15-25 minutes and 20-30 minutes respectively, thanks to the use of servo controls and a self adjusting system.

Keith Gooch, Managing Director of Logic TPS, says the competitive cost of the machinery, spares and changeparts provides users with a completely new option when it comes to upgrading blister packing lines.

"In the past, the fact that tooling can be expensive but often interchangeable between machines of the same make, has favoured staying with one supplier when installing new equipment," he explains.

"However, with the Hoonga machines, changepart costs are no longer a major consideration and the reduced operating costs mean a purchasing decision can be based solely on the capital outlay and cost per blister of the new line."

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Meanwhile, MediSeal has introduced its new Flexible Feeding system that enables tablets with wide dimensional tolerances and tablets of different sizes to be fed into larger pockets using a single format set. The heart of this solution is a newly developed tool which can handle two tablets of different sizes.

The example exhibited at last year's PPMA Show was designed for tablets in the range 8-9mm diameter and a height of 2.8-3.5mm, so economising on feeding tooling as well as shortening changeover times.

The capability for highly accurate feeding is now, therefore, a reality but there remains a possibility of misfills and empty pockets, especially when specialist feeding equipment is not installed. Moreover, product from start-up and test runs still needs to be recycled – especially when high value product is being packed – and so there remains a requirement for deblistering.

The latest in Sepha's line of deblistering machines is the new semi-automatic Mini Press-Out Universal unit aimed particularly at small batches and able to handle push-through blisters, child-resistant blisters, circular packs and multiple products.

Sepha's Press-Out Universal models employ an emptying mechanism said to provide gentle handling for even the most fragile tablets and in automatic format, with magazine feed and variable speed control, can process up to 50 blisters a minute.

For push-through blister packs, the Press-Out Manual is a portable hand-operated option, able to handle up to 20 blisters a minute using a single set of adjustable tooling and adjusts in 2 minutes to accommodate all blister sizes. The Press-Out Standard is an automatic option for push-through blisters, handling up to 60 a minute.

VisioTec, Uhlmann's specialist inspection company, has recently introduced the Vision4U system, giving 100 per cent non-destructive testing of blisters.

The machine is based on the VisioLeak rotary turret, which has 12 heads to lift all the blisters from the line and carry out leak detection using vacuum chambers and mechanical pressure over the lidding foil of each blister pocket. Sensors measure the deflection force of the foil, which indicates whether the pocket is intact or leaking. Speed is up to 300 blisters a minute and pinholes from 20 micron upwards can be detected.

Before entering the VisioLeak, blisters are also checked from below the web by a vision system for foreign matter between the product and pocket, as well as any cosmetic imperfections. A printing system is also available to identify all rejects before ejection from the line or leave the rejects blank, printing just the good blisters.

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DISPLAY BLISTER PACKING

Stanley combats waste with ffs line

Stanley Hand Tools' manufacturing plant at Hellaby, Rotherham, is now blister packing knife blades on a new form-fill-seal line supplied by Anchor Plastics Machinery, UK representative for the German manufacturer Koch.

The work of a project team from all three companies, which also established the design, the line incorporates a number of waste-saving ideas, including forming the blisters without skeletal waste. Blister loading and sealing are automatic and the Koch KBS-PT line incorporates flexible tool carriers that make it possible to pack a number of different products on one machine.

The line can also be readily integrated with a cartoner if required in the future.

"The fast cycle times of the Koch machine impressed me; these were most important for our financial justification," says Brian Hale, manufacturing engineer at the Stanley Hellaby site. In addition he notes that the Koch control system – which include extensive diagnostics and a modem – are particularly user friendly "just like your home computer and so easy to update or edit".

Saving materials: *New pack style for Stanley blades*

Relco UK, has recently added a new shuttle welder to its range for jobs such as sealing pvc and PET-G blister packs. The RWA series can be supplied as a 3.5, 5 or 7kW model and as a press only, single tray or twin tray version and incorporates a front-opening gull-wing interlocking guard to provide easy access.

Personna International is using a Packaging Automation PA182 semi-automatic hand-turned rotary table heat sealing machine to close trial quantities of blister packs for a new range of razors and blades. The machine was supplied on an open-ended hire arrangement.

Finally, Teneo (UK) has enlarged its range of impulse and constant heat sealing equipment with a new hand-held ultrasonic clam shell sealer to seal or tack lightweight clam shells and blister packs with a 3 x 5mm spot weld.

Able to handle OPS, PSP, PVC and EPS containers, the sealer is now used in a number of industries including cosmetics, fashion accessories, hardware, contract packing and bakery.

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