



## US Packaging Show Displays Many Pharma Machines

**A review of some of the many state-of-the-art packaging solutions that were on display at the PACK EXPO event, which took place at the end of last year in Chicago.**

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For pharmaceutical manufacturers, the time and effort required to travel to Chicago (IL, USA) for PACK EXPO International 2004 was well spent. With more than 2000 stands and over 100000 m<sup>2</sup> of exhibition space, there were hundreds of machines of interest on display. Among the most exciting were three tablet counters that represent a new state-of-the-art for these workhorses of the pharmaceutical packaging line.

### Tablet Counters

A tablet counter that borrows technology from capsule filling can reject single tablets, reducing the need to rework bottles. The counter relies on vacuum-based tablet/capsule handling and colour cameras to check various product characteristics such as colour, area, perimeter and length. Capable of operating at 30000 tablets/min, flipper gates reject any bad tablets

and a sensor confirms their arrival in the reject bin. For each good tablet, a sensor at the bottle neck confirms it drops inside. The dual model shown at PACK EXPO and destined for installation at a US facility in February features 16 channels per side, making it possible to fill 32 bottles at a time. Cameras are arranged so each one handles four channels. The system creates a data record compliant with 21 CFR Part 11. Changeover requires no change parts. A single model with 16 channels is also available (Electronic Tablet Counter; IMA Industria Macchine Automatiche SpA, Bologna, Italy).

For tight spaces, a monobloc unit with a 1.4×1.74 m footprint combines a rotary tablet/capsule counter with four counting stations followed by positions for desiccant or cotton insertion and cap application. An optical matrix array in the electronic counting heads scans tablets/capsules from multiple

angles to confirm size and shape, and detect any incomplete product. The system operates at a rate of up to 60 containers/min for 100-count bottles. Changeover is expedited via numbered change parts, which seat into place by gravity. With change parts removed, there's only a flat plate to clean (Bosspack RTC80MB Monobloc Rotary Tablet Counter; Romaco, Pompton Plains, NJ, USA [Figure 1]).

Another versatile monobloc combines electronic tablet counting with screw capping and 100% in-process weight control to catch containers with over/under counts or broken tablets. Options include cottoning and desiccant insertion stations. The system is compatible with laminar flow and can also be equipped with liquid or powder filling, or different closing stations. One of the first units is installed at Belupo in Croatia (Linoline Machine; Optima Packaging Group GmbH, Kugler Division, Schwäbisch Hall, Germany).

Another electronic tablet counter moves tablets from trays to precount gates to final gates at the rate of one hundred 100-count bottles/min/head. To maximize throughput, the counters self-adjust product delivery by checking the space between tablets/capsules and adjusting vibrator speed. Available in dual- and single-head versions, the machine features more precise stepper-motor-controlled rotary gates rather than pneumatic flipper gates. Product feeds from a bulk product hopper and is separated using an advanced vibratory feed system that consists of four slices, each with three lanes. Product falls into containers through an array of infrared sensors via a discharge chute and filling nozzle. A servo-controlled scroll system indexes four containers/cycle. Changeover is accomplished without tools on the recipe-driven machine with motorized power lift to adjust filling height (SwiftPharm 100 and SP 200 High-Speed Electronic Tablet Counter; IMA Nova Packaging Systems, Leominster, MA, USA).

### Other Filling Machines

To make it easy to differentiate product or change the level of active

ingredients, a continuous-motion linear filler is designed to roll up to the conveyor just ahead of the main filler. The unit's clean-in-place filling valves precisely measure and deliver high-velocity drops to add up to 2 grams of the ingredient to six empty containers simultaneously. High-speed controls and laser sensing to locate containers help the filler achieve rates of up to 1200 containers/min. Micro fibre optics provide dose verification (Micro/Dose fillers; Oden Corp., Tonawanda, NY, USA).

A sterile preassembled system with a product bag, sterile filter and peristaltic pump tubing assembly with nozzle simplifies aseptic filling, reduces changeover time and minimizes cleaning validation activities. All the operator has to do is open the presterilized assembly within the sterile area of the filler and install it using the unit's quick-connect hardware (DAFPA Disposable Aseptic Fluid Path System; Flexicon America Inc., Burlington, VT, USA).

A servo-controlled monobloc fills, plugs/stoppers and caps vials in volumes up to 113 g. The unit can also handle droppers or other fitments. A single-index version with two heads operates at up to 45 containers/min; while a double index version with four filling heads runs at up to 90/min. A capping prestart station

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preceding the torquing station reduces capping time (Filamatic Series MNB-2000 Monobloc; National Instrument Co., Inc., Baltimore, MD, USA).

### Cleaning and Conveying

Good hygienics, an essential characteristic of any pharmaceutical packaging line, depend on both cleaning and machine design. Super-heated steam can deeply clean and sanitize without chemicals and minimal moisture. Delivering saturated dry steam above 104.5 °C with 150 psi quickly kills bacteria and other microorganisms without harming the surfaces it contacts. In fact, the steam evaporates so quickly, cleaned surfaces do not retain heat or moisture (Blue Steam Systems; AmeriVap Systems, Inc., Atlanta, GA, USA).

Machine design almost always involves stainless steel construction. Stainless steel not only is easy to

**Figure 1** The compact monobloc from Romaco counts tablets and caps containers at a rate of up to sixty 100-count bottles/min.



clean and sanitize, but it also resists corrosion, oxidation and rusting. To link machines on the packaging line, a stainless steel conveyor features a modular, open-top design, which significantly reduces floor space requirements because it offers a curve radius of 6 in. instead of the standard 18 in. Preengineered components and brackets make the customizable system simple to assemble or modify (XE Conveyor; AutoPak Engineering Corp., San Juan, Puerto Rico).

Another stainless steel conveyor may be ordered in incline, curve and straight sections with a variety of side-guide styles. The zoned system features a mat-top belt and wash-down-compatible hardware, and can be ordered in polished or unpolished versions. The mat-top belt eliminates the need for rollers, provides a continuous surface for product conveying, and decreases the number of moving parts for simplified maintenance, installation and startup. Capable of moving at 300 ft/min, the conveyor has a live load weight capacity rating of 70 pounds/ft (Alvey Stainless Steel Conveyor; FKI Logistex, St Louis, MO, USA [Figure 2]).

**Figure 2** FKI Logistex now offers a stainless steel conveyor as a standard part of its line.



**Figure 3** The VC1380 automates the standard methylene blue dye test to check blister packs for leaks.



A blister packing system automates hand packing of cartons. As blisters pass on a conveyor, an air blast pushes the proper number into a chute. Blisters then fall into a carton and the system signals to the operator that the proper count is in place. The operator then closes the carton and pushes it onto a conveyor. The system can handle up to 350 blister cards/min (Ergonomic Blister Packing Station; AutoPak Engineering).

**Security**

Many exhibitors featured security-related products to help pharmaceutical manufacturers combat counterfeiting. A number of overt and covert technologies are available through a worldwide marketing agreement. The human and machine-detectable “signatures” are based on colour shifts created by vapour deposition technology or DNA technology and can be incorporated into forgery-proof packaging or labelling (identif GmbH, Germany, anticounterfeiting products, DuPont Packaging & Industrial Polymers, Wilmington, DE, USA).

For cold chain applications, a two-component time-temperature indicator (TTI) turns colour if proper storage temperature parameters are exceeded. Unlike traditional TTIs, which must be stored refrigerated or frozen prior to use, the two-component system does not activate until a clear activator label is placed over the base label. Since both components are pressure-sensitive, application is easily automated (TT Sensor; Avery Dennison, Industrial Products Division, Strongsville, OH, USA).

A fibre optic strap equipped with an active (battery-equipped) radio frequency identification (RFID) tag secures shipping containers and makes it possible to continuously monitor their integrity/security via a tamper-evident feedback system. If the signal carried by the strap is interrupted, the tag sends out an alert so security personnel can investigate. An onboard battery gives the tag a three year operating life and a potential for reuse multiple times. Tag frequency can be specified at 303.8 MHz for applications in North America and Japan or 433.9 MHz for Europe. Read ranges extend from

60 m to more than 400 m depending on the RFID infrastructure installed (Secure Strap Active RFID Device; Avery Dennison).

**Quality Control**

Several exhibitors showed non-destructive, validatable alternatives to the methylene blue dye test commonly used to check for leaks in blister packs. One off-line unit displays an image of the blister being tested and shows any faulty pockets on its touch screen display. Pinpointing the location of flaws is critical so blister packaging machine tooling can be adjusted to correct the problem (Q730 Leak Detector; Uson L.P., Houston, TX, USA).

A pick-and-place tester can be integrated with several models of automatic blister packers or used off-line. It performs a 2 minute test to identify leaks or seal flaws as small as 5 µm and provides a pass/fail score onscreen for each pocket (BlisterScan; Sepha Ltd., Newtownards, UK).

It is also possible to automate the methylene blue test. To run the test, the operator places a sealed blister pack at the bottom of bowl-like chamber filled with water and dye, secures it with a screen to ensure submersion, closes the lid, enters a personal code and presses the start button to create a vacuum in the chamber. The blister pack remains in the water under atmospheric pressure for a predetermined amount of time to allow the dye-filled water to reveal any pinholes, leaks or bad seals. A database stores adjustable parameters for vacuum, test time and penetration time. The automated process ensures consistent testing, prints a test report and frees staff to conduct other tasks while the test is cycling (Lippke Blister Tester VC 1380; MOCON, Inc., Minneapolis, MN, USA [Figure 3]). ■