

# Exterior Innovations

A SUCCESSFUL CARTONING OPERATION DEPENDS ON ATTENTION TO MANY DETAILS.

BY HALLIE FORCINIO

**C**artoning systems fill primary packaging with product or load secondary packaging with a pouch, bag, tray, jar, bottle or combination of primary packs/components.

Primary cartons hold products like rice or baking soda. Secondary cartons protect ready-to-eat cereal, frozen entrees and cough syrup as well as multi-component products like an inhaler plus patient information sheet or a meal kit with several ingredients like taco shells, seasoning and sauce packets.

The cartons themselves generally consist of renewable wood fiber-based

materials such as paperboard, microflute or laminations, although plastic structures and corrugated are specified for some applications. A range of shapes—rectangular, octagonal, hexagonal, triangular, gabletop, etc.—strengthen shelf impact. Adding functional features, such as easy-opening tear strips, tamper-evident seals, hand holes, dispensing devices, fifth panels and sift-proof seals, increases appeal.

Cartons may be erected, loaded and



The Criterion 3 Cartoner from R.A. Jones, capable of reaching speeds of 330 cpm, features a three-head, servo-driven, rotary carton feed powered by a low-level carton magazine with an ergonomic 40-in. height.

sealed on separate pieces of equipment or integrated systems. Cartoning is performed manually, semi-automatically or automatically on several types of machines. Motion can be intermittent or continuous. However, higher speed machines are typically continuous motion.

With so many variables, machine rates range from about 20 to 500 cartons per minute (cpm). Maximum speed is highly dependent on application and carton size with smaller cartons generally capable of running at higher speeds. Thus, the top speed for loading pouches of ready-to-eat cereal into 9-in.-wide cartons is about 200 cpm, but bottles of cough syrup can be loaded into 2.5-in.-wide cartons at up to about 400 per minute.

Equipment prices exhibit an equally broad range. “There are low end manual-load machines that sell for \$40,000, and then there are sophisticated fully automatic machines with all-servo change-over that go to \$1 million,” reports Eric Langen, sales and marketing representative for AFA Systems Ltd., Brampton, Ont., a supplier of vertical and horizontal cartoners and sleeves.

“Cartoner costs vary depending on ▶

## 21 Criteria for Cartoner Selection

- |                                      |  |
|--------------------------------------|--|
| • Product being packaged             | • Operator interface                           |
| • Packaging material                 | • Diagnostics                                  |
| • Operating environment              | • Energy consumption                           |
| • Speed requirement—surge            | • Build quality                                |
| • Footprint                          | (light-, medium-, heavy-duty)                  |
| • Desired flexibility                | • Aftermarket support                          |
| • Required uptime                    | • Experience of vendor                         |
| • Changeover points/time             | • Standard controls package                    |
| • Sanitary requirements              | (e.g., PackML)                                 |
| • Design attributes                  | • Cost to install/support                      |
| (mechanical vs. servo vs. pneumatic) | • Vendor’s time in business/financial strength |
| • Ergonomics                         |  |
| • Safety                             |  |

Source: ADCO Manufacturing Inc.

how refined the design is, the quality of components and products being handled,” explains Steve Stegora, western region sales manager/marketing director-Americas at Langen Packaging Inc., Mississauga, Ont.

Costs rise as speeds and level of auto-

mation increase. Features like track-and-trace capability, custom product control systems, robotic handling or washdown compatibility also will boost the price.

Stegora adds, “Sophisticated customers consider the Total Cost of Ownership,

which takes into account how efficiently a machine runs.” Any savings on the initial purchase price quickly evaporates “if a full-time operator is needed to ensure the machine runs properly,” he explains.

## **CARTONING TRENDS**

Cartoning equipment trends can be summed up as “more automation, more electronics and robotics,” says Leif Lindblom, export manager at Econocorp, Inc., Randolph, Mass., a maker of horizontal and vertical cartoning machines.

We’re also seeing “greater flexibility with reduced changeover time,” says Billy Goodman, director of CAMA USA Inc., Deerfield, Ill., a supplier of horizontal cartoning machines.

With greater flexibility, the same machine can run diverse materials, non-square carton shapes and multiple sizes (especially larger club store packs). “This has led to the proliferation of servo changeover technology where changeover can be completed in less than five minutes,” says Langen of AFA Systems. Servo technology also improves fault diagnostics, reduces the number of moving parts, minimizes maintenance and supports smooth, precise operation.

As a result a growing number of machines rely on linear servo technology “to control carton movement and optimize loading and sealing processes,” says Mike Wilcox, vice president sales, marketing and aftermarket sales at ▶

### **Cartoner Styles**

- Horizontal
- End load
- Top load
- Three-flap (triseal)
- Vertical
- Wraparound
- Combination machines

Delkor Systems, Inc., Circle Pines, Minn., a supplier of carton and tray forming machines, carton closing, including its model FLC-60, which uses linear servo tracking to precisely control and move the cartons through formation, loading, inspection and closing stations.

Linear servo technology "builds flexibility into the machine," agrees Rick Graff, product manager at R.A. Jones & Co., Covington, Ky. Linear-servo-based cartoners can accommodate varied inputs and outputs, accepting product from more than one lane and collating it in the desired pattern.

Although servo technology gets much of the credit for cutting changeover time, changeover on non-servo-equipped machines is faster today too. In fact, it's now possible to do a three-dimensional carton change in less than 10 minutes through the use



Compact rotary turret on servo-driven VC-VCA cartoner from AFA Systems replaces the traditional racetrack vertical loader. Design reduces machine size, moving parts and maintenance requirements and improves visibility into the machine.

of adjustment scales and counters. Other changeover-friendly design features include fully adjustable tooling, center lining and adjustable carton hoppers.

The demand for flexibility also increases the appeal of robotic systems. "With prices coming down, ease of programming improving . . . , robots are finding more roles in cartoning," says Scott Reed, vice president of sales, marketing and customer service at ADCO Manufacturing, Inc., Sanger, Calif., a supplier of horizontal end-load cartoners, top-load cartoners, vertical end-load cartoners

and wraparound sleeves.

Reduced changeover time goes hand-in-hand with improved ergonomics and cleanliness. "We have simplified changeover points and methods, developed low-level carton magazines and refined machine designs to improve cleanliness," says Stegora of

## Six Key Considerations When Purchasing Cartoning Machinery

Paperboard cartoning is one of the most versatile packaging formats available. The package material offers robust product protection and unparalleled graphic and branding opportunities as well as consumer convenience. Once the carton style itself is determined the decision can be further framed by evaluating the optimum technical and application requirements. Top considerations include:

**Production speeds** — The cartoning system should be designed for at least 10 percent greater throughput capacity than the process delivering product, so look for suppliers that offer a range of models within a specific technology so that the investment is matched to the requirement.

**Packaging environment** — Dry, wet, frozen, harsh (caustic clean up), all play a role in machine selection. Stainless steel construction and modern attention to sanitation concerns are increasingly important as the FMSA comes into effect.

**Modularity** — Modular designs offer flexibility to accommodate changing requirements and layouts as well as incrementally increased levels of automation. Top load systems are particularly well suited to adding robotic loading as an upgrade.

**Changeover** — If frequent changeover between package sizes or products is planned, look for “centerlining” aides and automatic menu based program changeover. Frequently fixed, but interchangeable, “tools” provide robust settings and can reduce operator mistakes reducing changeover time and ensuring a fast start-up to design specifications.

**Graphic HMI operator interface** — Look for HMI screens and layouts which are intuitive and self-tutoring. Comprehensive fault diagnosis and performance reporting help ensure consistent operation and speedy recovery when faults do occur. Look for systems designed to interface with other factory automation systems and which provide data collection.

**Integration** — Tight integration with ancillary devices such as coding equipment, scanners and upstream and downstream product/package handling equipment is crucial. Look for machinery that is designed for easy integration both mechanically and electrically and an OEM that offers to do this as part of its supply scope.

### **Ross Long**

*Vice President*

Kliklok-Woodman

Langen Packaging.

Reed reports, "ADCO is also paying close attention to the emerging FSMA regulations, and we are making significant effort to ensure that all of our machine designs can meet the most rigorous sanitary standards."

There's also growing demand for integrated systems that involve multiple machines or entire lines. Single-sourcing integrated packaging lines have advantages, according to Stefano Alestri, product manager of cartoning machines for Marchesini Group Spa, Pianoro, Italy, which includes a U.S. operation, Marchesini Packaging Machinery Inc., in West Caldwell, N.J. In fact, Marchesini recently designed and built a five-robot cartoning line for a multinational



Many of today's cartoners, like this one from Marchesini, rely on one or more robots to move product.

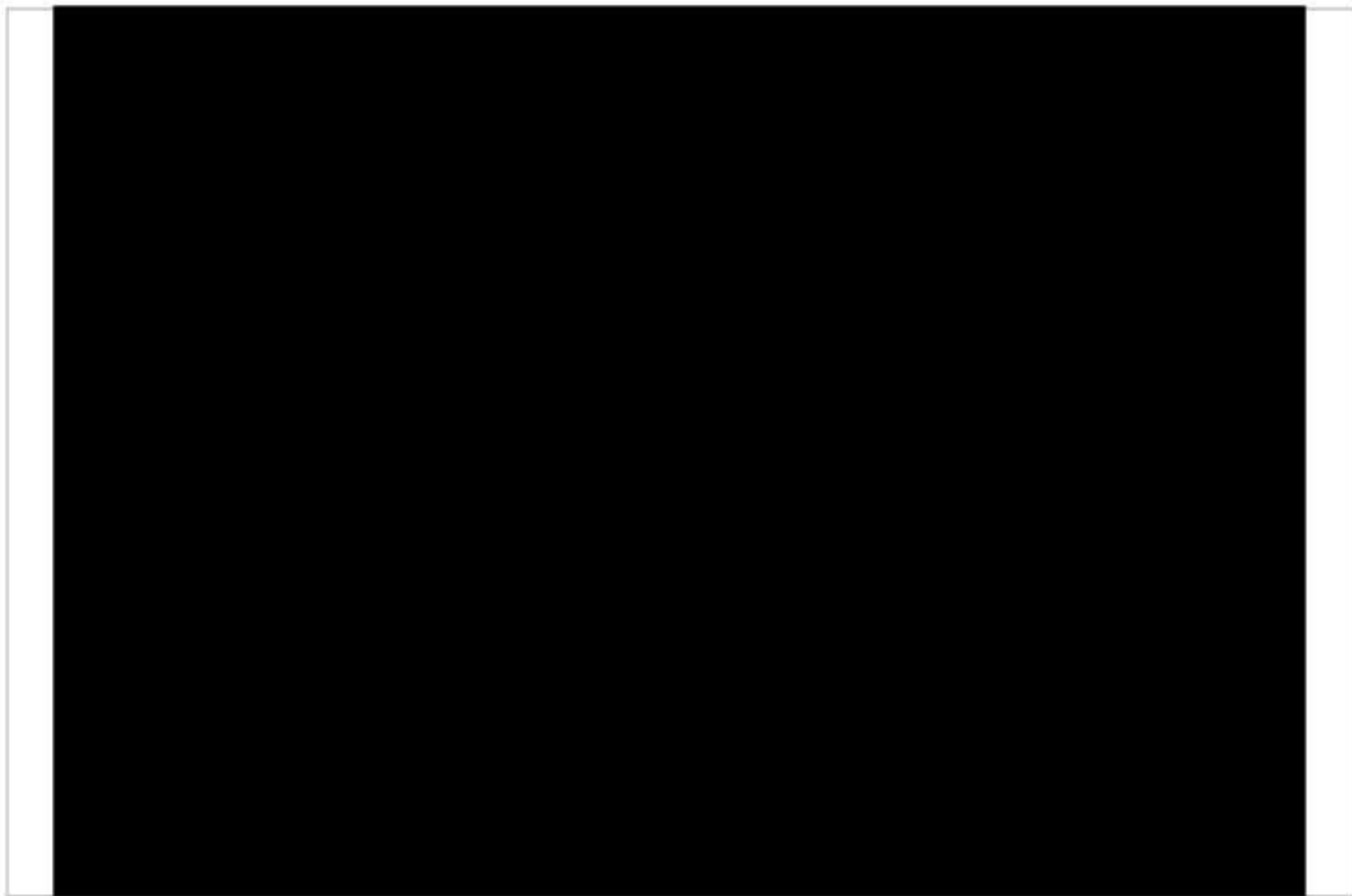
pharmaceutical manufacturer. It loads two different blisters into one carton as well as an inhaler, booklet and cardboard container. A single source means a coherent "construction philosophy, software and displays," explains Alestri.

Nick Bishop, vice president sales and marketing at Bradman Lake Inc., Rock

Hill, S.C., agrees, noting a single source "eliminates integrating diverse and eclectic groups of machinery from different suppliers and introduces commonality of spare parts, software programs, technical support, common maintenance programs, navigation of similar operator (human/machine interface) screens and, increasingly important, the need to extract all types of production output data and efficiency reports through an immediately accessible network system."

## RECENT INNOVATIONS

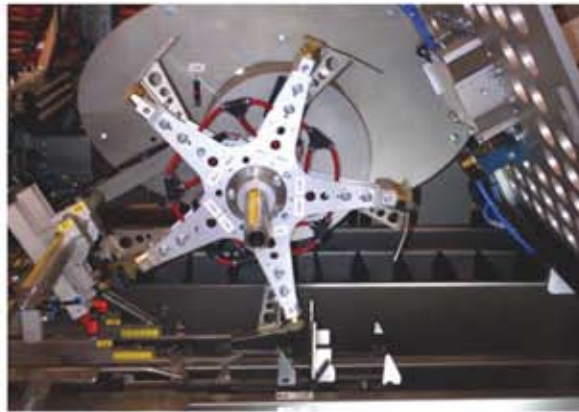
Econocorp has introduced a faster version of its intermittent-motion Spartan end-loading horizontal cartoner. The Spartan Plus model combines a two-head, rotary, servo-driven magazine pick-off



with an infeed using a high-speed pneumatic cylinder to boost speeds from 40 to 60 cpm. Carton sizes range from 2 x 1 x 5 in. to 10 x 4 x 12 in. (51 x 25 x 127mm to 254 x 102 x 305mm).

Specialty infeeds, developed by Langen Packaging, automate loading of flexible/non-rigid products and stick packs. "Additionally," says Stegora, "we expanded our patented five-head, rotary carton feeder to handle large-format cartons."

"Our latest cartoners, the C-500 and C-1000i, allow unobstructed access for operators and [contain] fewer components for improved reliability," reports Stegora. "The unobstructed operator access also improves machine ergonomics." Both are all-servo machines. The C-500 model handles small cartons with either intermittent or continuous motion.



Patented five-head, rotary carton feeder, originally designed by Langen Packaging to handle small cartons, has been adapted for use on cartoners running large-format cartons.

The C-1000i cartoner is made for larger carton formats and features intermittent motion.

Accessibility is an important attribute of Marchesini's MA80 cartoner with guard doors that have been redesigned to open fully. Capable of handling blister cards,

containers, perfume bottles and pouches, the system runs at 120 cpm and boasts an expanded carton size range from a minimum of 30 x 20 x 75mm to a maximum of 130 x 100 x 200mm on a carton conveyor pitch of 160mm.

Another all-servo machine, the VC-VCA Vertical Autoload Cartoner from AFA Systems, fits into a small footprint by replacing the traditional racetrack vertical loader with a compact rotary turret. Fewer parts in the turret-style vertical

loader simplify maintenance. In addition, the low level positioning of the turret improves ergonomics and safety since it eliminates the need for operators to climb stepladders. The VC-VCA machine handles cartons from 1 x 1 x 1 in. to 8 x 8 x 12 in. Optional push-button changeover reduces

changeover time from 25 minutes to less than five minutes since the only step performed manually is placement of cartons in the magazine.

Robotics replaces traditional mechan-

ical forming and loading assemblies to increase the versatility of the modular RCP-15 EnCompass from ADCO Manufacturing. As a result, the system adapts to handle top-load trays, tri-seal cartons,



Low-level carton magazine improves ergonomics on cartoners from Langen Packaging.

retail-ready packs, corrugated trays and corrugated regular slotted cases.

Another robotic unit, the CL 169 electronic carton loader from CAMA USA picks products from multiple lines and places them into continuous-motion article buckets. A cantilevered barrel loader provides easy access for maintenance. Designed for larger carton sizes ranging from 70 x 25 x 135mm to 320 x 100 x 320mm, the unit is rated at 250 cpm.

For lines that perform the carton-forming function on a separate machine, ADCO Manufacturing offers CF-600s and CF-1200s ControlARC2 servo-controlled top-load carton formers. Equipped, respectively, with single or dual head, the machines erect up to 120 lock- or glue-style cartons or trays per minute. A belt-driven feed maintains positive control of the material as it moves through the machine and into the precise, servo-controlled forming section. The ControlARC2 design also allows the carton magazine to be placed lower on the machine, significantly improving ergonomics over previous designs. Typical applications include retail-ready packages, snack foods, baked goods in trays, flow-wrapped products, frozen meats, dairy and household products.

A similar system, the dual-head HSS Servo Carton/Tray Former from Bradman Lake, either glue- or lock-forms a broad range of carton sizes at 130 or 150 cpm, respectively. For higher speed requirements, a triple head design boosts rates about 50 cpm. In op-

eration, flat carton blanks are stacked in the low-level hopper(s), which can be refilled during machine operation. Cartons are extracted from the hoppers using vacuum cups attached to a reciprocating arm and placed in front of the shuttle arm. If glued, the blank is positively driven over the applicator. At the forming station, a plunger descends pushing the blanks into the forming tools, folding up the side-walls and simultaneously gluing them to the corner flaps. Completed cartons are ejected onto an optional discharge conveyor. Carton types include three-flap closure, single-flap closure with dust flaps, hooded-lid closure, turn over end style and turn over end style with frame view.

## **MACHINE SELECTION**

A successful cartoning operation depends on a comprehensive understanding of project requirements, multiple design reviews and paying attention to many details.

"All aspects of the application have to be clearly defined," says Langen of AFA Systems. This includes required speed, product characteristics, carton dimensions, type of closure, pack patterns, layout and mechanical and electrical specifications. It's also essential to have detailed information about the equipment up and downstream of the cartoner. Special attention should be paid to product infeed and collation.

"Review both current and likely future requirements for this line with an examination of product sizes, pack sizes, collations and speeds and . . . ensure that there are detailed discussions with sales and marketing to understand what future pack configurations might be required," says Bishop of Bradman Lake.

Lindblom of Econocorp agrees, advising, "Always purchase some extra capacity. If you need 30 cpm, then purchase a machine with 40 cpm capability." He also rec-

ommends avoiding routinely running cartons at the top or bottom of a machine's size range. "When you are near or above the extremes of the size range, chances are the machine [performance] will be com-

promised," he explains.

Finally, Lindblom says, "The level of automation selected should be in line with an acceptable return on investment."

In addition, the level of automation

## packaging **BASICS**

specified must be balanced with budget constraints. "In today's environment, capital is tight, budgets have been cut and the desired level of automation may not be affordable," Graff says.

Other steps for a successful implementation include a comprehensive Factory

Acceptance Test (FAT) and a comprehensive Site Acceptance Test. Stegora of Langen Packaging concludes, "A successful FAT is imperative to a successful installation and having the machine quickly accepted by the manufacturing team after installation. Organizations can find

themselves in trouble by accepting a machine that does not successfully pass the FAT with hopes it will improve in the field, especially with the added pressure from manufacturing to produce product." **PMT**

**Hallie Forcinio** has been covering packaging industry trends for more than 20 years.

## packaging **BASICS**

### **CARTONING**

VCA has a very small footprint to save floorspace and improve operator optics during machine troubleshooting. The VC-VCA includes Allen Bradley controls and servo drives on all major motors.

#### **AFA Systems Ltd.**

[www.afasystemsinc.com](http://www.afasystemsinc.com)

905-456-8700



The VC-VCA Vertical Autoload Cartoner is AFA Systems' new high speed vertical cartoner. The VC-VCA features a compact rotary turret loading system that replaces the traditional racetrack vertical loader. This allows for easier maintenance for operators as it has fewer parts and is at an ergonomic level. In addition, the VC-