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Juiced-up machinery runs at high speed

A new high-speed aseptic line at Olympic Foods, Fontana, CA, runs 20,000 200-mL juice boxes/hr in multiple pack variations.

Jack Mans, Plant Operations Editor

Olympic Foods, whose origins date back to the 1960s, packages and distributes fruit juices under its own brand names, which include Citrus Sunshine, Nature's Genuine and Washington's Natural, and also under private-label arrangements with such grocery chains and distributors as Albertson's, Fred Meyer Stores, Safeway, Quality Food Centers and Western Family Foods. It also packages drinks for Tree Top and Newman's Own Organics.

In November 2004, Olympic bought an existing plant in Fontana, CA, and that plant now has eight packaging lines, including three juice-box lines from **Tetra Pak, Inc.** (www.tetrapak.com), as well as gabletop lines and a plastic-cup line. About 75 percent of Olympic's revenues come from orange juice, with the remainder from apple juice and other products.

Olympic's newest packaging line, which started production last February, runs 20,000 TBA 200-mL Tetra Brik(R) Slim aseptic juice boxes per hr. "We did a lot of due diligence on this between

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Tetra Pak and other suppliers, but in the end, we felt that Tetra Pak would work out best for us," says director of operations Chris Weddle. "We are running our own products in Tetra Pak packages, and obviously our current customers prefer Tetra Pak. We felt that most of our potential future customers would also prefer Tetra Pak."

Each machine on the packaging line has its own PLC and human/machine interface. They are all interconnected through an industrial network.

The key to the new line is a Model TBA/22 vertical form/fill/seal machine that produces the packages. The packaging material, which is a flexo-printed paperboard/foil/polyethylene laminate, also from Tetra Pak, is supplied in large rolls that yield 16,500 packages each. Two rolls are mounted on the side of the machine; one roll is running, while the second roll is ready to be automatically spliced to the first roll, when it runs out. The material is pulled from the roll and travels over dancer rolls, over the top of the machine and down into a sterilizing bath of 160 deg-F, 32-percent hydrogen peroxide solution. It travels through a squeegee that removes liquid peroxide, followed by a hot-air jet that blows off and evaporates the remaining peroxide.

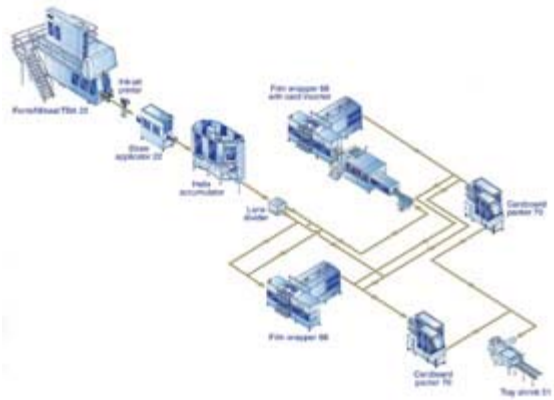
Two TETRA PAK packaging lines at California Natural Products, Lathrop, CA, run 11-oz aseptic packages of nutritional shakes. Read about it at **www.packagingdigest.com/info/califaseptic**

The flat, sterile material then passes over a roller at the top of the machine and begins its descent through the f/f/s section of the machine. As it descends, a thin plastic strip is applied to one edge, and the material is wrapped around a metal forming tube, where the edges are sealed together to form the longitudinal seam. Next, the tube of film travels past a filling pipe that runs down its center. The liquid level inside the packaging material, which rises above the filling pipe, is regulated automatically to achieve the proper fill in the package.

The tube containing the product then travels into the closing unit, which consists of two opposing vertical chains with 10 jaws and induction heaters that close at the end of each fill cycle to form the top and bottom seals of the package. The system incorporates a 63-step servo control that moves the material up or down in response to a photoeye that reads a mark on the package. A blade cuts the cartons loose after they are sealed, after which they drop around a curve and travel horizontally through a system that folds and glues the tops and bottoms to give the packages their rectangular shape.

Packages leave the vf/f/s machine single-file and convey past a Model 300 ink-jet printer from **Domino Amjet, Inc.** (www.dominoamjet.com) that applies the date and lot number. They then travel past an automatic sampling system that, at intervals set by Olympic, diverts 10 boxes for inspection. The system selects boxes coded one to 10 by the printer, reflecting the 10 vertical sealing jaws on the vf/f/s

machine. If a box is leaking, this enables Olympic to identify which jaw is malfunctioning. The system also identifies boxes made from spliced material and rejects three consecutive boxes(EM DASH)the box containing the splice and the boxes before and after the box containing the splice.



The complex conveyor network enables packages leaving the lane divider to be delivered to any of the downsteam equipment.
CLICK HERE to see a larger version.

Following this, the packages travel to a Tetra Pak TSA-22 straw applicator that hot-melt-glues a film-wrapped plastic straw onto the back of each drink box with the aid of a **Nordson Corp.** (www.nordson.com) 3100V glue applicator. To ensure precise application of the straws, the packages are lifted up from the infeed conveyor to a transport belt, which runs faster than the infeedd coveyor to ensure separation of the packages. The straws are cut from the supply web and glued to the packages with the help of pressure pads that move with the packages.

The packages then travel to a Tetra Helix spiral accumulator manufactured by **Hartness Intl., Inc.** (www.hartness.com). This unique, first-in/first-out unit has 10 levels that contain 400 ft of conveyor and provide five minutes of accumulation time with a total accumulation capacity of about 1,600 packages. In this operation, parallel, independently driven infeed and outfeed conveyors run in opposite directions through the unit and are mechanically linked by a free-floating gear, or package-transfer mechanism, dubbed the "spider." When the system is operating normally and both conveyors are operating at the same speed without package backups in either direction, entering packages encounter the spider and are transferred directly to the discharge conveyor.

The production capacity of 20,000 packages/hr, combined with its compact footprint, makes the new filler at Olympic extremely cost-effective.

If either conveyor slows or stops for some reason, the spider moves in the direction of the moving conveyor and transfers boxes from the slower to the faster conveyor. Thus, when the outfeed conveyor is stopped or is running slower than the infeed conveyor, the spider travels up the spiral and directs more of the packages into storage on the outfeed conveyor. Conversely, when the outfeed conveyor is running faster than the infeed, it begins to empty, so the spider travels down the spiral as it transfers bottles from the infeed to the outfeed conveyor.

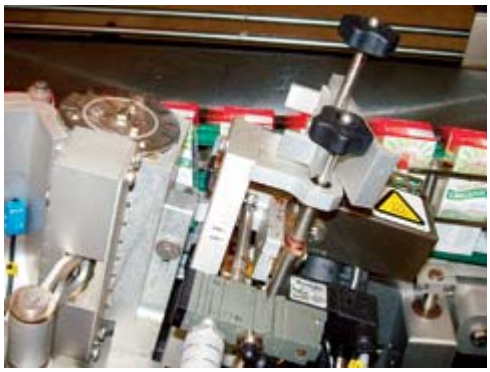
The accumulator incorporates 20 variable-speed conveyors, all of which run at the same speed. A photocell at the entrance to the unit measures the gap between boxes and adjusts the speeds of the conveyors to maintain a gap of 1/4 in. between the packages in the unit. If the accumulator fills completely, the control system shuts off the filler. The downstream equipment is designed to run 25-percent faster when packages back up in the accumulator, so when the line starts up after a downstream stoppage, it will slowly empty the accumulator. When the packages in the accumulator reach a sensor near the outlet of the unit, the downstream equipment is slowed to the filler speed.

Downstream equipment cannot keep up with the 20,000-package/hr output of the TBA/22 vf/f/s machine, so packages leaving the accumulator travel to a lane divider that directs them onto two conveyors feeding parallel streams of downstream equipment. If one of these streams is not in operation, the accumulator controls reduce the speed of the filler and the accumulator by 50 percent.

Two paperboard packers can run corrugated trays and cases.

Crossover lanes on all of the downstream conveyors allow the plant to transfer packages from either of these parallel conveyors to the other, so any package can be directed to any downstream piece of equipment. While the line runs only 200-mL drink boxes, it is able to run a wide array of pack configurations, all ending up in trays. These include 24 to 40 single packages in a single layer; 3-, 4-, 5-, 6-, 8-and 10-count multipacks in a single layer and in a double-layer tray for up to 60 packages in multipacks. In a further iteration, all of the multipacks can be assembled with or without a wraparound card.

From the lane divider, packages in each lane travel to a Tetra Model 68 film wrapper. Packages in one lane go directly into the wrapper, while in the other lane, the wrapper includes a card-inserter module that the packages pass through before being wrapped. In the latter case, packages are grouped into the specified arrangement (3-pack, 4-pack, etc.) as they enter the inserter. Cards from an overhead magazine are placed in front of the packages, which pick up the cards as they are conveyed through the unit. If a card is not required, the packages move through the inserter and into the wrapper without the card being inserted. On the other line, the packages are grouped into the specified arrangement and enter the wrapper directly. The wrapper incorporates two rolls of film. A pusher moves the packages into the sealing station, where the jaw moves downward bringing the plastic film with it. The heating unit welds the plastic together, and a knife cuts the package loose. The wrapped



The straw applicator hot-melt-glues straws to individual packages.

package is pushed out of the sealing area by the following group and is conveyed past nozzles that blow hot air onto the sides of the package to melt the film, after which it passes onto the discharge conveyor.

Next, the wrapped packages in each lane are conveyed to a Model 70 Tetra Pak tray packer. Olympic runs only the Tetra Tray, but the unit can be adjusted to run a wide variety of tray and wraparound options. The packages are fed to the unit through a distributor that separates the flow of packages into three parallel lanes. The packages are then fed into the packer and grouped into the required packing pattern as described previously. The assembled packages are moved onto a tray blank of corrugated board, which has been taken from the tray magazine. The blank is shaped around the packages and glued with hot-melt adhesive. For the two-layer pack, vacuum cups descend onto the packages and lift them into the air, so another layer can be assembled, after which the vacuum cups descend and place the top layer onto the bottom layer. The conveyor system is designed so that individual packages can bypass the two wrappers and can be delivered directly to the tray packers. The packers cannot pack individual packages in two layers, because the vacuum cups cannot pick up the individual packages.

The trays from both lanes discharge onto a common conveyor feeding a Tetra Pak Model 51 shrink wrapper. The trays are pushed at a right angle into the machine, which utilizes two rolls of film, one above and one below the infeed conveyor. The trays are pushed through the film, which is heat welded, after which it is cut as the tray is pushed out of the sealing area. The trays then travel through a heat tunnel, where the film shrinks tightly around them, after which they are manually palletized.

Olympic installed two streams of downstream equipment to keep up with the output of the vf/f/s machine.

Olympic worked with **Shrink Packaging Systems Corp.** (www.shrinkpackaging.com) to identify packaging films suitable for the Tetra Pak stretch/shrink wrapper. SPS collaborated with **Bemis Clysar** (www.clysar.com) to qualify a number of suitable PE film formulations. This was a complicated task, according to SPS director Byron Waugaman, because the Tetra Pak Model 68 wrapper imparts more stretch to the film than similar wrappers. SPS also successfully tested a ligher-gauge film that features higher gloss and clarity, greater seal strength and increased shrink force. Olympic is considering this for future use.

Each machine on the packaging line has its own dedicated programmable-logic controller and human/machine interface from **GE Fanuc Automation** (www.gefanuc.com), and these are all interconnected through a GE Fanuc Genius bus. The line does not have a switch that shuts down all of the machines simultaneously. Rather, the machines operate in a "double-handshake" mode in which each machine tells the machine before and after it, over the Genius bus, that it is or is not running. These machines start and

stop in accord with these messages and, in turn, send the information to the next machine in each direction.

The line also incorporates Tetra Pak's Packaging Line Monitoring System (PLMS), which tracks the performance of the complete packaging line, including the vf/f/s machine and downstream equipment. The system collects operating data for each individual machine and the line as a whole, such as running and downtime, reason for a shutdown, package output and other information, and transmits it every five seconds over the Genius bus. The PLMS also has a historical-analysis tool that can identify malfunction causes in the packaging line and a performance-analysis program that generates graphs and reports. At Olympic, all information from the monitoring system is sent to the PC on the vf/f/s machine, which serves as the collection point. It then transmits the data, also over the Genius bus, to other PCs in the plant. The data is also transmitted in real time to the Tetra Pak headquarters, where experts can provide advice and troubleshooting if it is needed.

More information is available:

Tetra Pak, Inc., 847/955-6000. www.tetrapak.com.

Bemis Clysar, 888/425-9727. www.clysar.com.

Domino Amjet, Inc., 800/323-4754. www.dominoamjet.com.

GE Fanuc Automation, 434/978-5000. www.gefanuc.com.

Hartness Intl., Inc., 864/297-1200. www.hartness.com.

Nordson Corp., 770/497-3700. www.nordson.com.

Shrink Packaging Systems Corp., 800/896-1662. www.shrinkpackaging.com.