

90-day shelf life + sustainability gains = progress at Byrne Dairy

Byrne Dairy has a proven track record in ESL products. Now it's using a new technology called 'dry sterilization' to get 90-day shelf life and get greener at the same time.



Pat Reynolds, Editor

Byrne Dairy of Syracuse, NY, is the first in the U.S. to install a Predis Combi blow/fill/cap system. Developed by Sidel (www.sidel.com), Predis technology is notable because it sterilizes PET preforms rather than PET bottles. Called "dry sterilization" by Sidel, Predis brings cost savings because the item to be sterilized, a preform, is so much smaller than a bottle. That means less hydrogen peroxide is required to accomplish sterilization.

Predis also delivers considerable sustainability benefits because much less rinse water is required to rinse hydrogen peroxide from a small preform compared to a bottle. Adding to the sustainability picture is the fact that the PET preforms can be lighter because the blown bottles are never subjected to the rigors of heating and rinsing. Only the injection-molded preform is.

Byrne's Predis system is part of an impressive new line running commercially since January of 2009. It occupies 11,500 sq ft of a 23,000 sq ft expansion Byrne added to its Ultra Dairy plant just outside of Syracuse. The plant has been home to a number of ESL lines since it opened in 2004, but they've all been for paper-based gabletop cartons. The Sidel system represents Byrne's first foray into PET containers. "When the existing Sidel Predis line is fully booked and we need more capacity, we have land for two more," says Nick Marsella, chief operating officer at the dairy.

Bottles produced on the new line are 8-, 12-, and 16-oz single-serve bottles of Extended Shelf Life (ESL) milk and non-dairy creamers. Byrne's ESL process results in products with refrigerated shelf life of up to 90 days, thus opening up new warehousing and distribution opportunities as well as expansion into convenience stores, quick-serve restaurants, vending channels, and food distributors across the country.

"Longer shelf life clearly gives our customers added value," says Carl Byrne, company president and CEO. "Fewer deliveries and longer date codes mean that less product will need to be thrown away."

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BUNDLING, FILLING. Filled, capped, and labeled bottles are funneled into four lanes ahead of the shrink bundler. Photo below shows bottles moving from filler to capper.



VERTICAL ACCUMULATION. This vertical accumulator plays a key role in keeping the blow/fill/cap system running non-stop.

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Marsella says the need for extended shelf life has been driven to some extent by the recent emergence of large distribution centers through which milk travels on its way from the dairy to the consumer.

"When milk goes through one of these distribution centers, you can lop off at least a week from its sell-by date," says Marsella. "So if all you have to work with is 20 days, the usual shelf life for fresh milk, you're not left with much time at all."

More flavors

The extra shelf life also makes it more practical for Byrne to run a wider variety of flavors. Take a mint chocolate-flavored creamer, for example. If Byrne produces that product knowing the bottles have only a 20-day shelf life, the production run is sure to be a short one. After all, if bottles are produced in huge numbers, there's too great a risk that some won't be sold within 20 days. But if the shelf life is 90 days, a longer run makes sense, and longer runs are always more efficient.

"With 90 days you can get some critical mass behind a flavor," says Marsella. "You can build a nice display in the store. You're less reluctant to experiment with new flavors."

Marsella notes that the Sidel Predis system is perfectly capable of producing shelf-stable aseptic containers that require no refrigeration



and have a shelf life considerably longer than 90 days (see packworld.com/webonly-28262). But distribution patterns that are firmly established in the U.S. didn't make aseptic packaging all that appealing, and Byrne's customers weren't pushing it either.

When asked if he had any misgivings about being the first to use the relatively new Predis technology, Marsella responds, "Not really. We did a lot of microanalysis of European product produced with this technology, and everything checked out fine. It's all a matter of delivering a sterile bottle to the filler. It's not guesswork. You're not hoping it will work. You apply chemistry and science so that you know that it works. We also found the Predis option attractive because we wanted the sustainable packaging part that comes with it."

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January of this year was when the new line started producing commercially saleable bottles. In pretty short order, says Marsella, the line was reaching its rated speed of 300 bottles/min.

At the head of the line is the Sidel Predis system, which comprises a 10-station blow molder, a 40-head filler, and a 20-head capper. As preforms are fed single-file toward the blow molder, a vacuum system "de-dusts" them and the outer threads are treated with a UV light. All preforms have the same 38-mm neck finish. But preform weights are different depending on the size of the bottle being made. For example, the preform for the 12-oz bottle weighs 15 g while the 16-oz bottle takes a 22-g preform.

The PET preforms are not clear because Byrne has them made



OVERHEAD PALLETIZER. The overhead palletizer collates shrink-bundled bottles in the desired pattern and then pushes them smoothly onto pallets.

with a 5% mix of a colorant called Holcomer UHT White from **Holland Colours** (www.hollandcolours.com). This protects the milk from light that might harm flavor, diminish nutritional value, or shorten shelf life. "With the colorant and the full-body shrink sleeve label we feel we're in good shape," says Marsella. "It's something we'll continue to monitor."

Into the oven

Once inside the enclosed and overpressured Predis chamber, a 25% hydrogen peroxide solution is vaporized on the insides of the preforms, which are then inverted and sent into the heating oven. The heat of the oven softens the preforms so they can be blown into bottles. The heat also activates the hydrogen peroxide sterilant. UV light sterilizes the outsides of the preform. A system of star wheels then transfers the preforms into the blow molds. The entire Predis chamber is accessible by means of glove ports. This lets Byrne clear minor jams or make other corrections without opening up the cabi-netry and breaking sterile conditions.

"Our 12-oz bottle weighs 15 grams, while the industry standard is 16.4," says Marsella. "We can be lighter because our PET bottles don't have to withstand all the heat and stress of sterilization." But is the lighter bottle difficult to handle at 300/min? "The bottle weight really isn't an issue when it comes to ease of handling and convey-



INSPECTION SYSTEM. Capping torque, cap position, and fill height are all checked automatically by this high-speed inspection system.

ing. Throughout blowing, filling, and capping, the preform and then the bottle is held only by its neck, so the lightweighting presents no empty-bottle handling issues at all."

While extrusion blown HDPE bottles that undergo aseptic or ESL filling require a foil liner to be heat- or induction- sealed to the bottle finish before the closure is applied, Byrne's PET bottle needs no such inner seal. That's because the finish on the PET preform is created through injection molding, a process inherently more controllable and precise than the extrusion blow molding process that produces

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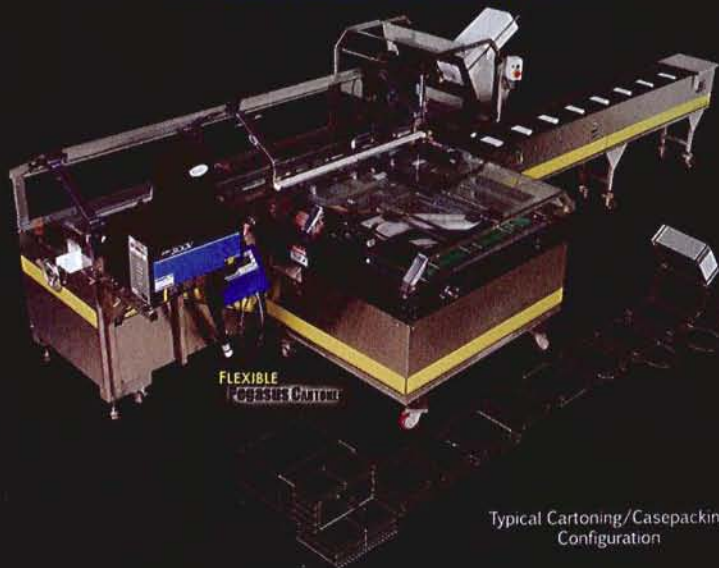
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a HDPE bottle. When an injection-molded closure is torqued firmly onto an injection-molded neck finish, a sufficiently hermetic seal is achieved without any need for a foil inner seal. All the same, some of Byrne's customers ask to have the foil liner included. Marsella explains why.

"Suppose we contract fill for a customer and their product is distributed nationwide with someone else contract filling out west and

using the foil seal. If consumers west of the Rockies are accustomed to seeing the bottle with a foil seal, then it's a good idea to be consistent and have that foil in the east, too." A foil sealing unit from **Fords** (www.fords-packsys.co.uk) sits beside the enclosed sterile chamber for that reason. It cuts circular foil seals from rollstock that is pre-sterilized by the supplier and sent in hermetically sealed bags. As the foil material transitions into the sterile filling and capping chamber, it's sterilized with UV light. Once it's sealed in place, the threaded closure is applied right over it.

With or without foil liners, bottles are given an injection molded PP cap supplied by **Berry Plastics** (www.berryplastics.com). The caps are sterilized by a spray of paracetic acid followed by a water rinse. But Marsella is carefully watching an emerging technology called electron beam sterilization. Should it deliver on its promise, it could eliminate both the paracetic acid sprayed on the cap and the water used for rinsing.

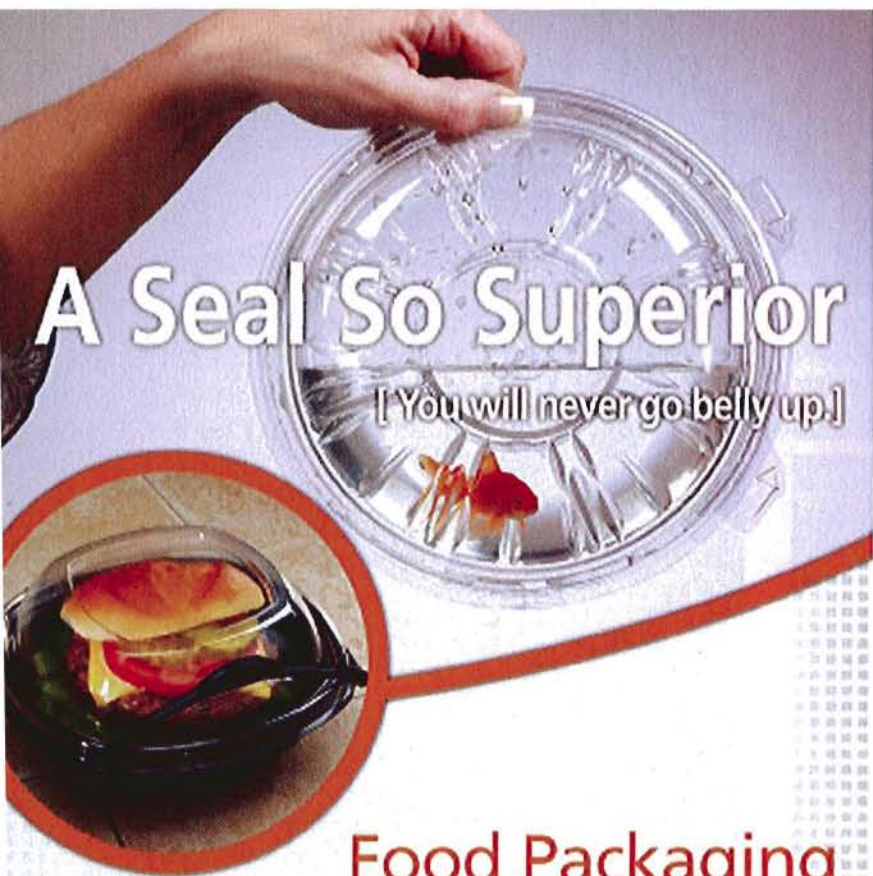
* Next is a Dynac vertical accumulation system from **Hartness International** (www.hartness.com).

"The idea is to keep the blow/fill system running nonstop," says Marsella. "If we have a problem anywhere downstream with the labeler or the tray packer, bottles are automatically diverted into the Dynac, which gives us about 90 seconds of accumulation time before the blow/fill system is affected in any way. That may not sound like much, but it's actually huge. And the fact that the accumulation is done vertically is also a key. These ESL plants—with galvanized columns, tile floors, stainless steel everywhere—are expensive propositions. If you can accumulate vertically and keep your footprint that much smaller, it really helps rein in costs."

Laser coding

Just downstream from the Dynac accumulator is a full-body shrink sleeve labeler from **Sleeve International** (www.sleeve.com). An air knife from **Sonic Air Systems** (www.sonicairsystems.com) blows moisture off the bottles just ahead of label application so that the moisture doesn't interfere with the smooth adhesion of the label to the bottle sidewall. Also applied ahead of labeling is a laser code on the bottle sidewall that identifies which filling valve, capping head, and foil sealing head was used on each bottle. The laser coder comes from **Videojet** (www.videojet.com).

"This code is not for consumers, it's for us," says Marsella. "We also have an inspection system from



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Heuft (www.heuft.com) that is checking for capping torque, fill height, and so on. So if a bottle is rejected, or if out in the distribution chain there are any problems at all, we go to the laser code to know immediately which machine and which station in that machine produced a substandard outcome."

Bottles then run through a shrink tunnel, make a U-turn, and are conveyed a considerable distance before reaching the tray packer. Along this stretch of conveyor is a cap sorter/feeder and a cap applicator from Arol (www.arol.com) These two machines are deployed when Byrne is producing coffee creamers, which have a more elaborate dispensing type closure than the milk bottles do. When Byrne applies this dispensing overcap, which comes from Portola (www.portpack.com), either the foil seal or the 38-mm closure has already been applied to the bottle back in the Sidel system. So neither the Arol machines nor the caps they handle need worry about sterilization of any kind.

"Longer shelf life clearly gives our customers added value."

A Videojet ink-jet coder puts a production code on each cap, whether it's a flat cap applied in the Sidel system or a dispensing closure applied by the Arol machine. Bottles are then accumulated and sorted into four lanes as they make their way into the Cermex (www.cermex.com) shrink bundler that puts bottles in trays or pads or wraps them unsupported. When trays or pads are part of the bundling operation, they're formed beneath the bottle-conveying level and rolled up to meet the bottles. Film is applied around the trayed bottles and then the film is shrunk down right over tray and bottles. A Videojet applicator puts a thermal-transfer-printed label on the side of each shrink-wrapped bundle.

At this point the shrink-wrapped trays leave the floor level and are conveyed at an overhead level to an Alvey A-881 palletizer supplied by Intelligrated (www.intelligrated.com). "Sidel steered us to the Alvey palletizer," says Marsella. "We had a different one in here originally but it couldn't quite handle the pace. We paid a little more for the Alvey system, but it gives us more reliability, efficiency, and flexibility."

The final machine in the line is a stretchwrapper from Wulftec (www.wulftec.com) that encases loaded pallets in film before they make their way into warehousing and distribution.

Looking back over what has been a pretty exciting installation and startup, Marsella says the two things that continue to impress him the most about the new line are its flexibility and its consistent effectiveness in the microbial kill department. He admits that it requires a great maintenance team from beginning to

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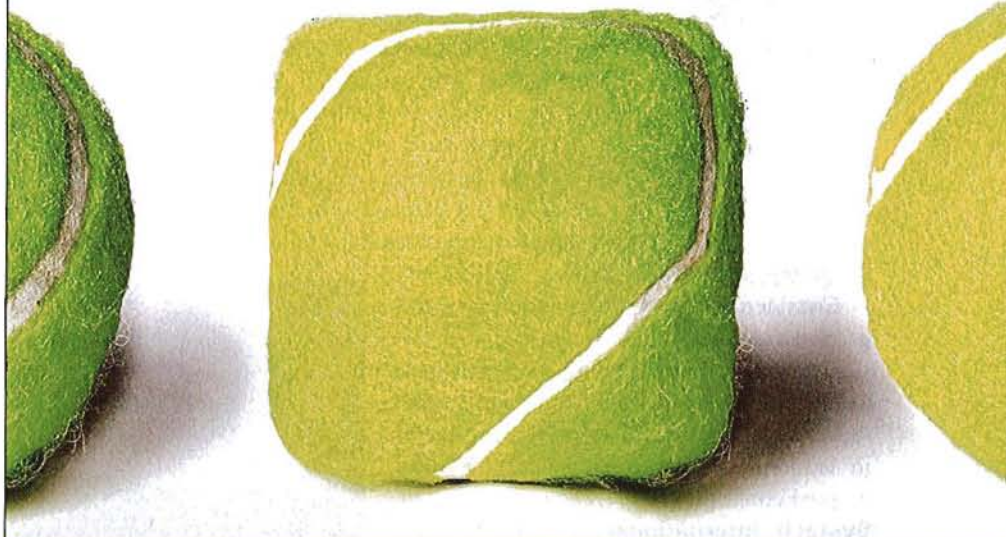
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end because of how tightly integrated everything is. "It reminds me of a garden hose," he observes. "Step on it anywhere and the entire hose, up and downstream, is affected. But the system has also proven to be very robust. That's going to come in handy now as we begin to bring volumes up." 🌐

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