

# packaging digest

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## Robotic arm creams manual palletizing

**Cabot Creamery Cooperative finds flexible robotic solution to replace manual palletizing of multipacks and cases of cultured products. New system reduces labor expenses, meets Cabot's aggressive production requirements and eliminates a difficult job for operators.**

**Anne Marie Mohan, Senior Editor**



**ROBOTIC**  
control

Best known for its award-winning cheddar-cheese varieties, 84-year-old Cabot Creamery Cooperative in Cabot, VT, is also a big cheese in the cultured dairy products market. Since 1953, Cabot has successfully milked its affiliation with the cooperative's family-run farms to churn out dairy products that include sour cream, cottage cheese, yogurt and dips, as well as Crème

Fraiche.

In 2001, increasing demand from national retail and foodservice customers for Cabot's non-cheese selections necessitated a move from manual palletizing of shrink-wrapped multipacks and corrugated cases of cultured products to an automated solution.

Installed in October, 2001, the ABB FlexPalletizer™ 4.0 robotic palletizing cell from systems integrator NCC Automated Systems, a subsidiary of LineSource, Inc., offers added flexibility. Automating the palletization of two different package types from two lines simultaneously, the solution has allowed Cabot to meet its production requirements, while decreasing its labor costs and protecting its operators from repetitive stress injuries.

## Cabot on the moo-ve

Established in 1919 when 94 dairy farmers pitched in \$3,700—\$5 per cow—and a cord of wood each to fuel the boiler, Cabot Creamery was acquired in 1992 by New England-based Agri-Mark Cooperative and today operates an 85,000-sq-ft manufacturing plant, as well as two retail facilities. One thousand five hundred farmer-owned dairies provide the high-quality cows' milk used to produce Cabot's famed Vermont Cheddar Cheese.

Also made from the milk is Cabot's range of cultured dairy products, which include Crème Fraiche, flavored yogurt and dips, full- and no-fat cottage cheese, and light-, full- and no-fat sour cream. For the retail market, Cabot packages its dairy products in white, polypropylene containers from Sweetheart Cup in six sizes, from 8 oz to 2 lb. These containers are gathered in SPOT-PAK® packaging for distribution. Produced on equipment from Delkor Systems, the SPOT-PAK combines flat, corrugated pads and shrink film to bundle products together, without the use of corrugated cases or trays. For its foodservice customers, Cabot uses 5-lb tubs, which are packed in corrugated RSCs.



**A custom-designed mechanical gripper arm enables the robot to gently handle shrink-wrapped multipacks at high throughput speeds.**

In all, Cabot's cultured dairy product offerings total 53 stockkeeping units, produced on two of the facility's eight production and packaging lines.

## **Growth prompts automation**

Before automating palletizing for its two cultured-product packaging lines in 2001, Cabot was using from one to two operators per line, depending upon product size, to manually stack SPOT-PAKs and corrugated cases. Says Cabot plant manager Marcel Gravel, "The drawbacks were congestion, ineffective product flow and line layout, inefficiency, which adversely affected other departments, and the potential for repetitive motion injury."

These problems, along with a need for increased production on these lines, led Cabot to move the lines to a different area of the plant, where palletizing would be performed in a 30-deg-F environment, and to consider a robotic palletizing solution.

"We knew that robotic automation would eliminate the need for our employees to deal with the physical demands of heavy loads and quick case rates in a cold environment," says Gravel. "Plus, unlike conventional machines, a robotic palletizer can run several different products simultaneously."

However, he recalls, many of the systems integrators contacted for the project declined to submit proposals, stating that the production requirements, the facility's space restraints, the diversity of product sizes and the use of two packaging types presented too great a challenge. "NCC was the only integrator that developed a solution to address all the variables of our process and assured us that its robotic solution would meet our requirements," Gravel tells PD.

"While we were impressed with NCC's design and robotic palletizing experience, since this was our first robotic installation, we were cautious," he adds. "To alleviate our concerns, NCC arranged for an ABB representative to visit us and review the proposed solution. That meeting not only reassured us that the FlexPalletizer would meet our production requirements, but it also provided us with further validation of NCC's strong strategic partnership with ABB. As discussions evolved,

NCC's expertise in packaging, robotics and systems integration became apparent."

The ABB FlexPalletizer 4.0 cell supplied by NCC consists of an IRB 640 robot with an S4Cplus industrial controller, two infeed conveyors with product rotators, two pallet conveyors, one pallet stack, one slipsheet stand and safety fencing, all of which fit into a 20 x 29-ft area. "NCC was able to think of solutions outside of the box to allow the system to fit into the allotted space," says Gravel.



**Cabot's retail products are unitized using a construction of corrugated pads and shrink wrap that eliminates the need for trays or cases.**

In designing the solution, NCC also had to ensure that the robotic arm could accommodate both the corrugated cases and the special requirements of SPOT-PAK packaging.



The robot's mechanical gripper carries 20 to 30 lb of corrugated cases from a product outfeed conveyor to a waiting pallet.

SPOT-PAKs are created when a flat, corrugated pad receives "spots" of glue on its surface. After the glue is placed on the pad, products are placed on top of the glue, and the entire unit is shrink-wrapped. This creates a very flexible package that requires special handling on conveyors, as well as customized end-of-arm tooling that can meet aggressive throughput requirements.

Relates NCC's system sales engineer, Kevin Mauger, "The biggest challenge was developing a reliable gripper that handled the SPOT-PAKs carefully. Once we did that, we made extensive modifications to the standard software code generated by ABB's PalletWizard™ software to obtain the necessary moves with a nonstandard gripper. "The mechanical gripper in combination with the new PalletWizard control orientation feature, which gives it the ability to accept cases at

the pick-up location in various configurations (sometimes width- and sometimes length-leading), enabled us to build the pallet patterns using fewer picks and places. Without this feature, the system would not have been able to meet Cabot's production requirements."

## Robot has a whey with palletizing

During operation, the IRB 640 robot, controlled by ABB's S4Cplus controller, picks up empty pallets measuring 40 x 48 in. from the pallet stack and places them on a pallet-discharge conveyor. It then retrieves three to six SPOT-PAKs or corrugated cases, depending on product size, from one of the two powered-roller accumulating conveyors feeding the cell, and places them on the pallet. Next, it returns to the infeed conveyor for more product, and continues the cycle until the unit load is complete. According to Gravel, pallet heights typically measure from 3 to 6 ft, according to the product.

To program and select various pallet patterns, operators use the system's PalletWizard pallet design software. The off-line Windows-based tool defines the products, patterns and loaded pallets, and automatically generates robot programs. For Cabot's requirements, 15 different patterns have been created, which are accessed by the operator through a touchscreen.

From the same panel, the operator can also monitor and control the status of peripherals, such as conveyors and gates.

ABB's PalletWare™ FPS software is linked to PalletWizard and acts as an online tuning system, compensating for variations in product sizes.



**Completed pallet loads are conveyed out of the palletizing cell, where they wait for transport by forklift to Cabot's distribution cooler.**

With a 114-in. reach from wrist center and six axes of motion, the IRB 640 provides "flexibility and a greater range of adjustment," relates Gravel. The robot can operate at up to 1,200 cycles/hr and has a load capacity of up to 352 lb, including the gripper. At Cabot, the weight range for products palletized is anywhere from six to 12 lb for the SPOT-PAKs, and from 20 to 30 lb for corrugated cases. The robot is also capable of simultaneously stacking both packaging formats.

When a unit load is complete, the pallet is automatically

discharged out of the cell via the conveyor. From there, the loads are transported by forklift to Cabot's distribution cooler.

By automating the palletizing process, Cabot can now stack up to 27 SPOT -PAKs/min and 8 corrugated cases/min, for a total output of 75,000 to 100,000 lb/day of product, while using just one operator to oversee the robot. "We were able to reassign two people to other duties," relates Gravel. "This resulted in a net savings of \$57,000 per year."

## A bright future with robotics

In evaluating the automatic palletizing installation, Gravel attributes its success to the support of NCC. "Since this was our first robotic installation, we were concerned about the technology, support and service, and the return we would get on our investment," he says. "NCC's diligence throughout the process gave us confidence that we were getting the right solution for our needs. Its ability to document a two-and-a-half-year payback on the system assured us that we were making a sound business decision.

"Working with NCC, we have developed a comfort level with robotic technology, as well as an understanding of how it can help our profitability and productivity. Having seen the impact that robotics can have, both on production and on our ability to eliminate ergonomic and environmental challenges for our employees, we are currently evaluating additional implementations of the technology."

### More information is available:

**Robot, controller, robot software: ABB Flexible Automation, Inc.,** 262/785-3566. Circle No. 201.

**Palletizing cell integrator: NCC Automated Systems,** 215/721-1900. Circle No. 202.

**Plastic containers: Sweetheart Cup Co.,** 800/800-0300. Circle No. 203.

**SPOT-PAK system: Delkor Systems, Inc.,** 800/328-5558. Circle No. 204.