

Drive & Control profile

ServoBeverage Packer Fills Demand for Specialty Beverage Packs



In Modelo's Guadalajara plant the ServoBeverage Packer allows the company to run 12-count standard pack, 12-count refrigerator pack, as well as 18-count cartons.

Bosch Rexroth servo system manages motion axes for maximum productivity and pack pattern flexibility on Thiele's new cartoner

More and more, beverage companies are offering products in new 12-count refrigerator packs. Designed to fit easily on a refrigerator shelf, the refrigerator pack has a user-friendly dispensing feature widely embraced by consumers. Other beverage packaging trends include specialty items such as coffees, fitness drinks and high-energy drinks typically

characterized by non-traditional container sizes, which are often offered in smaller four- or six-count packages.

For Thiele Technologies, Inc. (Minneapolis, MN), a leading packaging equipment manufacturer and subsidiary of Barry-Wehmler Companies, Inc., both of these trends have

Challenge

Improve cartoning machine pack pattern flexibility, lift productivity, reduce maintenance and control footprint

Bosch Rexroth Solution

- MKD servo motors
- DKC servo drives
- PPC motion controller
- Visual Motion motion control software

Benefits

- New system erects up to 240 cartons and handles up to 2,200 containers per minute
- All-servo solution enhances machine's ability to do quick changes for different package configurations
- Reduced footprint and greater packaging productivity realized
- MKD servo motors are IP65-rated and offer peak torque up to 187 Nm, for demanding load and throughput requirements
- Motor's brushless design and lifetime bearing lubrication provide virtually maintenance-free performance



Servo axes on the Thiele ServoBeverage Packer include a rotary placer, six infeed starwheels, carton flights, barrel cam loader, and overhead confiner, all orchestrated by Bosch Rexroth servo drives and motors.

acted as catalysts for significant design changes in the company's cartoning equipment, sparking a shift from traditional mechanical drives to the greater flexibility and control provided by an all-servo motion system. As a result, Thiele recently introduced its new ServoBeverage Packer specifically designed for the beer, soda and specialty beverage industry.

Calling upon the application and engineering experience of distributor Motion Tech Automation (MTA – Oakdale, MN) and the servo technology from the Bosch Rexroth Corporation's electric drives and controls group (Hoffman Estates, IL), Thiele successfully designed the all-servo cartoner to erect up to 240 cartons per minute and handle up to 2,200 containers per minute in a variety

of heights and configurations from 6.5 ounces to 16 ounces.

From four-packs to 30-packs to the popular two-by-six configuration of the refrigerator pack, Thiele's ServoBeverage Packer handles all of these needs, while effectively increasing uptime, reducing the number of moving parts, simplifying operation and maintenance, and slimming down the footprint compared to its mechanically driven predecessors.

Packing in Control

The Bosch Rexroth servo system on the ServoBeverage Packer comprises ten independent servo motors individually controlled by a servo drive, a master PPC motion controller with a DeviceNet interface and programmable limit switch (PLS) with VisualMotion software that synchronizes all operations. The base machine's ten servo axes include a rotary placer, six infeed starwheels, carton flights, barrel cam loader, and overhead confiner, all orchestrated

by Rexroth DKC servo drives using SERCOS and SGP Firmware and Rexroth MKD servo motors with absolute feedback.

Rexroth DKC servo drives are especially suited for control and positioning tasks up to 27 kW. These drives offer a large number of functions, including positioning block mode, angular and velocity synchronization and cam and camshaft functions, plus an integrated virtual-axis generator. Compact drive electronics also allow the use of standard 300 mm cabinets for a compact machine design. Another element of the servo-drive system, the Rexroth MKD servo motors are IP65-rated and offer peak torque up to 187 Nm. Their maintenance-free operation is attributed to their brushless design and bearings with lifetime lubrication.

Stephen Kaye, Thiele cartoning and casepacking product manager, says this cartoner is special because of its servo-controlled pack pattern



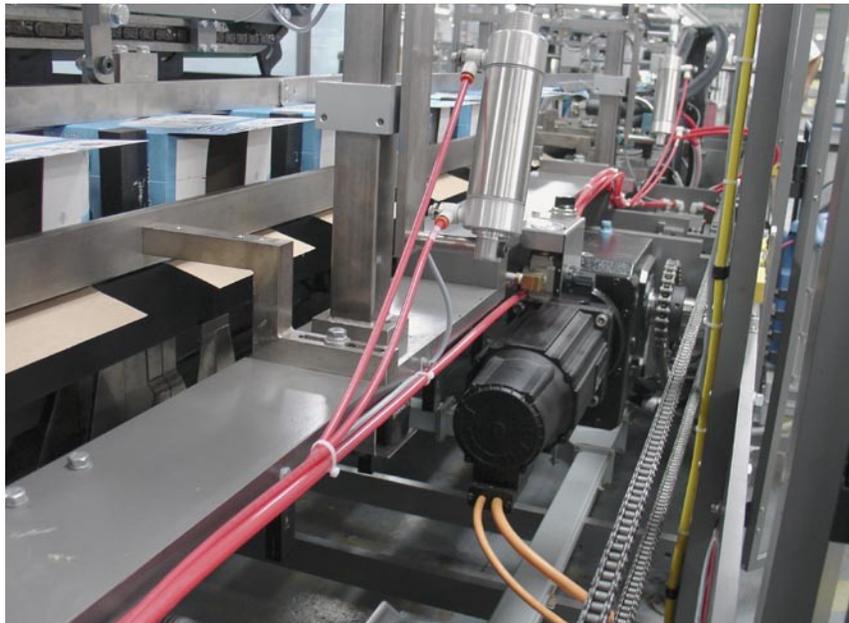
Thiele's unique servo-controlled starwheel infeed alleviates under-filled cartons, even with a low surge product at the infeed.

change. “Previously this mechanical change took an hour and now it takes less than ten minutes,” he says. “The servo-controlled starwheel infeed also means you never get under-filled cartons, even with a low surge product at the infeed.” Kaye also describes an overload protection feature in which the infeed side of the starwheel, where bulk material is introduced, is capable of detecting overload, meaning fewer crushed or broken containers. In addition, because of the gentle container-handling characteristics of a starwheel, product scratching and denting is minimized.

Shawn Nelson, MTA sales technician, also noted several design challenges, one of which was the machine’s small footprint. Thiele used SolidWorks 3D modeling software to help condense the machine’s size. The inherently smaller dimensions of the servo controls further enhanced this size reduction. Another challenge, says Nelson, was the time to market, which was less than four months. “This is very aggressive for a new design,” says Nelson. “Thiele also had a commissioning time for the controls of less than one week so it was a tight schedule, but in the end it all came together beautifully.”

The Refrigerator Pack – a “Back Breaking” Challenge

According to Kaye, there are several challenges in designing a cartoner to handle the refrigerator pack. “The first challenge is erecting the carton from a flat blank because the length and width dimensions are almost equal, making it square



With Bosch Rexroth MKD servo motors, Thiele’s ServoBeverage Packer Cartoner erects up to 240 cartons per minute and handles up to 2,200 containers per minute.

when viewed from the end,” explains Kaye. “Square cartons, as opposed to rectangular cartons, frequently ‘back break’ against themselves and fold into an L-shape instead of opening during set-up at high speed.”

Kaye notes that Thiele uses a proprietary method to open and erect square cartons at nearly 100 percent efficiency. The cartoner’s servo-driven rotary carton set-up allows electronic timing between it and the carton flight system. This feature minimizes debugging time during the start-up process and also greatly simplifies the fine-tuning required to accommodate material variations on the customer’s production floor.

The second challenge according to Kaye was to simplify the pack pattern changeover. The



A Bosch Rexroth servo drive automatically adjusts the glue pattern and timing according to pack pattern and machine speed.

refrigerator pack is two cans wide by six cans deep—a configuration that is accomplished using six

servo-driven starwheels. Thiele's unique starwheel design is superior to the old selector bar systems because it allows pack patterns to be changed electronically rather than mechanically. The starwheel handles beverage cans, PET (polyethylene terephthalate) bottles and glass bottles, orienting the containers into the pack pattern without damaging the product.

"If the customer wants to run a two-by-six 12-pack configuration and then change to a three-by-four 12-pack configuration, for example, the operator simply selects the pack pattern change on the HMI touchscreen, which alters the servo parameters to achieve the new pack pattern," says Kaye.

The HMI provides simplified operation and troubleshooting with touchscreen controls such as product selection and recipe adjustment, PLS control adjustment, PLC zone adjustment and servo axis phase adjustment. The HMI also supplies servo position monitoring, servo motor torque load feedback, a product shift register tracking screen and production statistics, including product count and fault history. Additionally, HMI screens are displayed in English or Spanish, a feature available on all Thiele cartoners and casepackers.

Thirdly, because the refrigerator pack is only two cans wide, the pattern could separate when being pushed into the carton using the previous selector bar technology. The Thiele ServoBeverage Packer beverage machine incorporates



The Thiele ServoBeverage Packer incorporates a servo-driven overhead guide system, which eliminates the possibility of pack separation during the carton loading process.

a servo-driven overhead guide system, which eliminates the possibility of pack separation during the carton loading process. Again, because the guide system is servo-driven, it automatically and precisely adjusts when selecting a different pack pattern and assures quick, consistent carton feeding,



Ten servo axes are handled by Bosch Rexroth DKC servo drives which offer positioning block mode, angular and velocity synchronization, and cam functions.

even in the event of upstream stoppage. A "No Can/No Carton" feature also detects missing cans before insertion.

A final challenge of the refrigerator pack is the special glue pattern required for the can dispensing feature built into the carton. The specific glue patterns are controlled through the Rexroth servo drive so that the glue pattern automatically changes depending on the selected pack pattern. The servo drive also automatically adjusts the glue pattern timing depending on machine speed.

Reflecting back on the project, Kaye gives a lot of credit to MTA and Bosch Rexroth for the success of the ServoBeverage Packer. "Our relationship with MTA and Bosch Rexroth has been strong and successful from the very beginning of our development on this machine," states Kaye, who noted MTA's technical sales team worked with Thiele engineers to develop and size each application for the correct Rexroth servo motor and gearbox combination. Kaye says Thiele continues to use MTA's technical engineering support as a "first line of defense" to work through new application needs, and Bosch Rexroth's technical support when additional expertise is needed for special applications.

Success Is Brewing

Kaye says the ServoBeverage Packer recently began production with customer Modelo, the leading brewery in Mexico that produces Corona and Modelo beers (www.gmodelo.com). In

Modelo's Guadalajara plant, which produces beer at a rate of about 125 million gallons per year, the ServoBeverage Packer will allow the company to run the 12-count refrigerator pack, as well as 18-count cartons. The Guadalajara plant is one of seven Modelo plants in Mexico and has been in operation for nearly 40 years.

The Grupo Modelo personnel responsible for selecting and implementing the Thiele ServoBeverage Packer explain that the plant's downstream equipment, specifically the cartoning area, had been unable to keep pace with a recent change in process equipment upstream. They also noted that

previously the plant could only run one carton presentation, whereas now the innovative Thiele cartoner allows them to run a variety of configurations to serve new market demands.

In addition to equipment such as the ServoBeverage Packer, Thiele's comprehensive packaging machinery product line includes continuous and intermittent motion cartoners and casepackers, case erecting and closing systems, shrink bundlers, rotary and reciprocating placers, friction feeders, and palletizing systems. Thiele products can be easily configured into a complete and fully integrated packaging solution.

Rexroth
Bosch Group