Drive & Control **profile**

Changing Lanes

Linear Modules Handle Laner Machine's High Acceleration Rates and Load Requirements

The Hartness GlobalLaner 2260 straddles an existing conveyor along a beverage or packaging line and takes single-file rows of bottled products like milk jugs and diverts them to downstream areas for additional processes such as case packing.

When turnpike traffic is funneled left and right into the tollbooths, each driver must be prepared to pay the toll in order to continue his travel. This same scenario also plays out in the packaging world. Upstream processes like container blowmolding or filling stations lead to downstream processes such as sealing or packaging. Laner machines are used in organizing products for the next operation by rapidly dividing the line and diverting products left and right as needed, creating multiple lanes for case packing, shrink wrapping, or further processing. Moving products into multiple lanes is

How Hartness International Turbocharged its GlobalLaner

Bosch Rexroth Solution

- MKR 20-80 Belt Drive Linear Modules
- Ball Rail® system for even greater side load support
- Two-year warranty on the linear modules—twice the length of a traditional warranty

Benefits

- Linear modules can accelerate at 1 m/s^2
- Line speed of 200 feet per minute (fpm)
- The GlobalLaner is twice as fast as other laners on the market
- Linear modules handle the load demands from 45 pounds of product
- Easily handles 1.75-liter jugs
- Continuous product flow—no disruptions

designed to add speed and relieve congestion along the packaging line, and just like the driver at the tollbooth, products are moved through for their final destinations.

Hartness International (www.hartness.com), headquartered in Greenville, SC, is one company that intimately understands the critical nature of packaged goods traffic patterns. Hartness recently introduced a laner to the packaging and bottling industries that pushed the limits of line speed, while also protecting product packaging along the line. Called the GlobalLaner 2260, this laner's ambitious design called for a linear belt drive module with an acceleration rate of 1 m/s^2 to keep pace with the line speed of 200 feet per minute (fpm). To give the laner the ability to relocate a section of bottles to any point in the grid, Hartness incorporated three linear modules on each GlobalLaner. Two X-axis linear modules are connected to a common shaft and driven by one servo motor. The third linear module is also servo driven and acts as the Y axis.

The performance requirements for the GlobalLaner are ambitious: 550 bottles of 1.75-liter orange juice per minute. Typical laners can only achieve accelerations of half that rate. The GlobalLaner is twice as fast as any other competing laner. Knowing this, it is not surprising that several linear modules failed the tests in the prototype stage of the design, as they repeatedly broke down under the stress of the side load created due to the product shifting and the demanding acceleration requirements.

The Hartness GlobalLaner 2260 employs a linear belt drive module with an acceleration rate of 1 m/s^2 to keep pace with the laner's line speed of 200 feet per minute.

After several rounds of testing modules from various suppliers, Hartness called upon automation solution provider Livingston & Haven (www.lhtech.com), which has a facility in Greenville, to provide linear modules that could not only accommodate the demanding acceleration rates of the GlobalLaner, but also manage the intense load demands from 45 pounds of product without breakdown.

After reviewing the specifications for the GlobalLaner, Livingston & Haven selected the MKR 20-80 Belt Drive Linear Modules from Bosch Rexroth Corporation (www.boschrexroth-us.com) to do the job. "We evaluated the linear modules Hartness had already tried and were acutely aware they needed a more robust design," said David Long, Livingston & Haven automation specialist. "Our experience with the Rexroth linear modules and their performance, plus the full support of the Rexroth team in Charlotte, made us comfortable recommending them to Hartness for the GlobalLaner."

According to Long, Livingston & Haven teamed up with Bosch Rexroth to test the modules, and together they confirmed that with two modules on the X-axis (one driven and one idler) and one module on the Y-axis, the MKR Linear Modules could meet the acceleration and load demands Hartness wanted. Rexroth also took the project one step further by providing a confidence-

Bosch Rexroth linear modules withstand the stress of the side load created from product shifting and demanding acceleration requirements.

Hartness uses a Rexroth Ball Rail® system on the linear motion portion of the GlobalLaner to provide even greater side load support.

boosting two-year warranty on the modules—twice the length of a traditional warranty.

Fully-Loaded

The Hartness GlobalLaner 2260 straddles an existing conveyor along a beverage or packaging line and takes single-file rows of bottled products like milk jugs and diverts them to downstream areas for additional processes such as case packing. For high-speed applications, the GlobalLaner can achieve up to 200 fpm, gently handling the laning of the containers by not stopping or gripping the product. The laner can run multiple shapes and sizes of containers, such as empty PET bottles for dish detergent, liquor, cooking oil, and beer bottles. The unit can operate with one lane in bypass mode or up to the maximum module travel length. It can modulate its speed according to the infeed and outfeed conditions as a result of the tight coupling between the servo motor and input shaft of the gear reducer and the output shaft and drive pulley.

Due to the smooth acceleration and deceleration of the linear modules and the subsequent absence of container contact, the GlobalLaner produces little noise and no label damage. The continuous motion of the GlobalLaner does not disrupt the flow of products, whereas a standard laner will typically stop product flow during a jam, which can cause breakage when bottles collide. In addition, product and line configuration changeovers can be performed in less than two minutes by hand wheel guide rail adjustment, while the motion controller manages the number of lanes and the line speed.

Using the GlobalLaner, a process involving 1.75-liter jugs of orange juice, for example, may require taking one line and splitting it into six lines for packaging. It was the 1.75-liter product size that presented one of the bigger challenges for Livingston & Haven when selecting the linear modules.

"These jugs were some of the toughest to accommodate on the line because they presented the greatest moment loads that the laner and linear modules were required to handle," said Long. The moment load describes the load placed on the linear modules when dividing product flow into multiple lanes. According to Long, at this point in the process the laner shifts the products, which creates a side load on the linear module.

"We had to pay special attention to the inside track of the linear module that controls the load and product shift to ensure the module could handle the load without breakdown," said Long.

The Rexroth MKR 20-80 Linear Module selected for the GlobalLaner features an AC servo motor and a pre-tensioned toothed belt drive for these demanding speed and load requirements from orange juice jugs running at a rate of 550 bottles per minute. The modules are designed with anodized aluminum frames and carriages with low-maintenance, one-point lubrication. Each module's cover is constructed using a corrosion resistant steel strip that performs to the DIN EN 10088 standard.

"Previously the GlobalLaner 2260 prototype was outfitted with some non-Rexroth linear modules, but they couldn't handle the speed," said Mathias Coulomb, Hartness controls manager. "With the high acceleration and deceleration rates of 1 m/s^2, previous modules began losing position. We then switched to the Rexroth modules based on the recommendations of Livingston & Haven. The quick and easy access to parts combined

with service and support from Livingston & Haven and the Rexroth group in Charlotte have been incredibly beneficial. If we have issues, they are very helpful."

Recently, Hartness began adding the Rexroth Ball Rail® system to the linear motion portion of the GlobalLaner. The Series 16 71, size 20-40 Ball Rail complements the MKR Linear Modules by providing even greater side load support.

The Rexroth Ball Rail system features a Generation 2 runner block design, which helps machine builders like Hartness shorten assembly time, cut machine cycle times, increase production, and reduce lubrication and maintenance costs. The runner block enables industry leading travel speeds of 5 m/s and acceleration up to 50-G. The high load capacity of the Ball Rail system comes from optimized force distribution within the runner block. The integrated lubrication system uses a foam insert to release lubrication to the balls over time and thus provides 10 million meters of maintenance-free travel.

"The linear modules have allowed us to achieve unprecedented line speeds with their exceptional drive acceleration rates," summarized Coulomb. "Rexroth's willingness to provide a two-year warranty on its linear modules and Ball Rails also demonstrated to us their confidence in their product's performance and in the GlobalLaner application," he added. "Their commitment, which is complemented by the service and support of both Rexroth and Livingston & Haven, definitely boosts the benefits we offer when selling to our customers. It gives us an even greater degree of confidence in the product we're selling, and it gives our customers confidence in their purchase of the Hartness GlobalLaner."

Rexroth
Bosch Group

Bosch Rexroth Corporation
5150 Prairie Stone Parkway,
Hoffman Estates, IL USA 60192-3707
Telephone (847) 645-3600
www.boschrexroth-us.com