

Drive & Control profile

T-TEK Beverage Palletizer Saves Energy, Runs Faster with Bosch Rexroth Servo System

Energy savings and speed improvements estimated at 20 percent on T-TEK's high-speed beverage palletizer with Rexroth servo and regenerative energy system

It's no secret that people enjoy soft drinks. In fact, studies show that many people enjoy at least one soft drink per day. With demand and consumption this high, faster production is an obvious challenge for packaging companies. However, with energy prices on the rise, production speed isn't the only concern. Additional emphasis is now being placed on ways to control energy consumption, soft handling of lighter and thinner packages, and palletizing a rapidly widening range of packages.

T-TEK Material Handling, Inc. (Montgomery, AL, www.t-tek.com) recently developed a new high-speed beverage palletizing machine that not only performs faster than earlier models, it uses less energy—with help from a **Bosch Rexroth** servo system (Hoffman Estates, IL—www.boschrexroth-us.com).



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T-TEK specializes in building material handling systems for the beverage industry, with an emphasis on palletizers for loading cases of soft drinks and bottled water. For the design of their new TS Series palletizer, they worked with Rexroth's **Electric Drives and Controls** technology group and their distributor, **FPS Technologies**,

Challenge

Develop palletizer with higher performance and more energy efficiency

Bosch Rexroth Solution

- IndraDrive M intelligent digital servo drives with open interface
- HVR power supply for regenerative energy
- MSK servo motors with intelligent feedback

Results

- 15 to 20 percent faster cycle time
- Smoother deceleration for delicate products extends component life and lowers maintenance costs
- Higher level of control for delicate products provides sustainability in packaging, reducing the amount of plastic needed for plastic bottle production
- 5-percent hoist speed increase
- 10 percent faster pallet changeover
- Smaller motors and regenerative energy capability for estimated 20-percent overall energy savings



Instead of brake resistors, T-TEK uses Rexroth's servo system to put energy back into the system.

a [Womack Supply Company](http://www.womack-machine.com) (www.womack-machine.com) to develop a servo system that could increase speed, provide better material handling and use less energy. As a result, the TS Series palletizer achieved those goals using Rexroth's [IndraDrive M drives](#), [HVR power supply](#), and [MSK servo motors](#).

High-Speed Palletizing

T-TEK's three-axis palletizer is designed to handle a wide variety of packaging configurations of cans or bottles in layers containing as many as 32 packages each. During beverage production, the filled packages move down the packaging line to the palletizer, which handles them at a rate of up to 180 packs per minute.

When beverages enter the palletizer, they are oriented into a specific pattern. Each layer is offset from the previous, and the entire accumulation is placed on a pallet, layer by layer. Once the pallet is fully loaded, the pallet is lowered

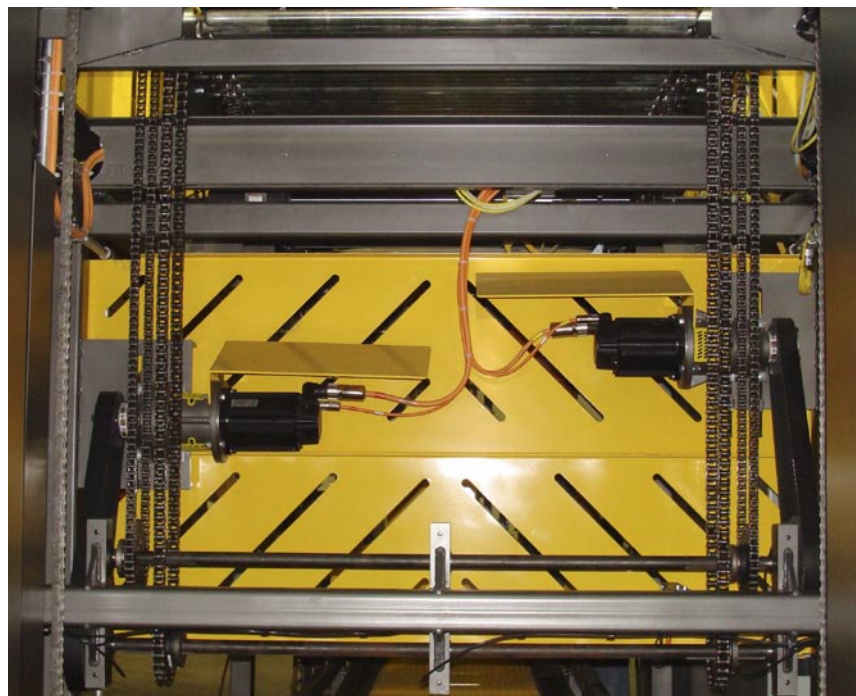
and ejected and an empty pallet is lifted up into position for the process to begin again. The filled pallets proceed down a full-pallet conveyor, where they can be stretch-wrapped and picked up by a forklift.

Rexroth Servo System for Faster Production, Improved Control

T-TEK identified three primary components in their palletizer where speed and energy usage could be improved: the apron, compression and hoist. As a layer of beverage cases moves through the palletizer, the apron allows each layer to drop cleanly on the hoist. The compression mechanism applies pressure and squeezes that portion of the layer and holds it in place so the apron can move out from under it before the layer goes onto the pallet. The hoist is responsible for raising and lowering

the beverage pallets, which often weigh in excess of 2,000 pounds fully loaded. The hoist positions itself within 1/10th of an inch regardless of how full the pallet is. Essentially, more than ten times every minute the machine will extend a layer onto the apron, clamp a layer, pull back the apron, and lower the hoist. As often as every 40 seconds it must eject the fully loaded pallet, and put an empty pallet into place without slowing the incoming product. The machine has to be able to do this 20 hours a day, 360 days per year.

During the apron and compression cycles, T-TEK's machine previously averaged around six seconds per cycle. Using Rexroth's IndraDrive M series drive system, the process now cycles at under five seconds, a 15- to 20-percent improvement



Using highly efficient Rexroth MSK motors, T-TEK can produce faster results with smaller motors.

in cycle time. The IndraDrive M drives and MSK servo motors used in the palletizer meet the demands of high-positioning accuracy, power density, speed and efficiency used in automation motion control. The IndraDrive has distributed intelligence in every drive allowing for fast calculations of the current loop and velocity loop closures within micro-seconds to meet these high demands. The open interfaces available on the IndraDrive such as SERCOS, PROFIBUS-DP, DeviceNet, analog, and parallel interface allow for communications to the higher level machine.

Due to the increase in control, the components in T-TEK's TS Series palletizer are moving faster but decelerating more smoothly with less jarring. This is crucial not only because of the benefits like extended component life and lower maintenance costs, but because the demand for sustainability in packaging has led to the use of lighter and thinner material for product packaging. Plastic



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bottles are now produced using almost one-half the plastic used only two years ago. Palletizers are being challenged to handle these cases at higher speed but also more gently than ever. Control throughout the compression process is vital. Improper compression of packages can easily lead to product damage and waste, especially with the thinner materials. The TS Series palletizer uses the Rexroth servo to maintain a very high level of control for even the most delicate packaging.



Using Rexroth's IndraDrive M drives and MSK servo motors, T-TEK saw a 15- to 20-percent improvement in apron and compression cycle times.

Using Rexroth drives and motors also led to a significant improvement in the palletizer's hoist operation, which now runs about five percent faster than before. In addition, the necessary acceleration and deceleration of the hoist has also been reduced, with the amount of time required to change out pallets going from nearly nine seconds to less than eight seconds, resulting in an eight- to ten-percent overall improvement in speed.

Less Energy, Higher Efficiency

Another immediate benefit from using Rexroth drives with the HVR power supply involves the concept of *regenerative energy*. Regenerative energy is created during an application where the load possesses more energy than the motor, as is often the case when lowering heavy pallets. Motors convert electrical power into mechanical power for the machine. However, servo motors have the potential to generate electricity, too. Simply put, as that heavy pallet decelerates, the braking motor turns into a generator converting mechanical power back into electrical power, which needs to be removed. Traditionally, most systems would take this excess energy and burn it off using a brake resistor which generates heat and may actually use even *more* energy for cooling off the control cabinet.

The palletizer hoist, which raises and lowers heavy loads, produces a large amount of regenerative energy. Instead of brake resistors, the palletizer uses Bosch Rexroth's MSK motors, IndraDrive M servo drives and HVR power supply to

take the extra energy and regenerate it back to the main 3 phase power by the HVR power supply, thus giving energy back to the power company. In addition, the excess energy can be used to maintain the DC Bus voltage for running the other servo drives on the DC Bus, rather than using power from the incoming main 3 phase power. The advantage is converting usable energy for the machine by powering the other servo motors on the DC voltage bus that may be in acceleration mode, instead of burning off the energy to a resistor.

“With Rexroth’s servo technology, we’ve significantly reduced the machine’s energy consumption,” explained Brian Traff, vice president of T-TEK. “Although our goal throughout was to improve the performance of our packaging capabilities, the energy savings that accompany this solution is a welcome bonus for our customers,” he remarked.

Prior to using Rexroth servo components, T-TEK used a 20-horsepower motor to power their hoist. Now, with highly efficient Rexroth MSK servo motors, they can produce faster results with only a 10-horsepower motor which also permits better case handling and greater load deceleration control, saving more energy. The MSK

motors feature intelligent feedbacks, meaning the drive can read each motor for its current, torque and speed capacities, thereby allowing for greater motor control and faster start-up. With the smaller motors and regenerative drive capabilities, Traff said he estimates the overall energy savings to be in excess of 20 percent compared to the machine T-TEK built about six months previously.

Partnership Forged Through Time

The positive benefits of the development of the TS Series palletizer have already begun paying other dividends. T-TEK is using what they have learned to convert other motor and even hydraulic or pneumatic cylinder applications to servo control. “We are seeing that the benefits extend well beyond the considerable performance improvement. We are investigating several other applications to implement as servo solutions,” noted Traff.

According to Traff, the palletizer servo project was successful in large part due to the long-standing relationship with Rexroth distributor Womack Machine Supply. “I would classify them as one of our most reliable distributors, and our sales representative provides a higher level of service than



Every 40 seconds, a fully loaded pallet is lowered and ejected. Using Rexroth’s drives and motors led to significant improvement in the hoist operation.

any of T-TEK’s distributors, of any type,” added Traff.

He stressed that Bosch Rexroth’s application engineering support and their global reach was also a key factor. “Rexroth offers good local, as well as solid international support,” Traff said. “We have applications in Mexico and Canada, and the support we receive from the Rexroth staff has always been extremely helpful from the design phase through field implementation and follow up. Their strong reputation within the packaging industry made them an easy selection,” he added. “Bosch Rexroth helps our TS Series palletizer to vastly outperform our competitors,” said Traff.

Rexroth
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