

Drive & Control profile

Conveyors Drive Golf Ball Packaging to Productivity



Sleeved Wilson golf balls after heat-shrinking carried on Bosch Rexroth TSplus conveyors

Mention dimples in front of an avid golfer and be assured he won't think of his daughter's winning smile. He'll think of golf balls. Golfers love golf balls. Today's golf balls are high-tech items benefiting from advances in materials and manufacturing. The serious golfer can discuss differences in core compression and cover hardness and seriously defend why his ball of choice improves his game.

The obsession with golf balls is one reason Wilson Sporting Goods, headquartered in Chicago, Illinois, produces millions of golf balls each year. With over 16 different ball types and a complete assortment of clubs and accessories to meet the needs of the casual recreational golfer, the serious amateur golfer, and the professional, Wilson remains a leading driver in outfitting golfers.

Challenge

Achieve higher levels of automation and reduce costs on golf ball packaging line

Bosch Rexroth Solution

- Bosch Rexroth TSplus conveyor
- BS2/K transverse conveyors
- EQ2/T tandem-lift conveyors

Benefits

- Increase automation on nonprogressive assembly system
- Production rate of 12 dozen packages per minute
- Cycle time reduced from 18 to 5 seconds
- Extreme flexibility in configuration, pallet size, speed, and transport media
- Engineered for easy maintenance and minimal downtime

Wilson makes a lot of golf balls—enough to make Wilson seek to lower costs by achieving higher levels of automation on the golf-ball packaging line. The existing j-pack line used five operators to package a dozen balls every 18 seconds. Wilson sought to increase productivity and reliability by moving to an automated system.

Wilson took its needs to DeWayne McKinney, vice president of sales for Handling Systems, Inc., of Nashville, Tennessee. For additional support, Wilson chose to involve Industrial Design and Fabrication, a systems integrator of custom industrial machines located in McEwen, Tennessee. Brian Travis led the IDF engineering team.

McKinney suggested using a Rexroth TSplus conveyor for moving work pallets from station to station. Each pallet holds a fixture with four nests to allow four sets of golf balls to be packaged simultaneously. McKinney,

a long-time Rexroth distributor, knew from experience the reliability of TS conveyors. “TS conveyors are great for nonprogressive assembly—they’re sturdy, reliable, and easy to implement into a design such as that Wilson was looking for,” says McKinney.

The resulting machine uses a rectangular racetrack-style setup, with pallets circulating from station to station around the track and back to the beginning, where they begin again. The basic sequence of operation is this (with each step representing a station along the conveyor):

1. Four plastic sleeves are automatically inserted into the four nests of the fixture by an Axon EZ-100 sleeve applicator.
2. The fixture is checked to ensure sleeves are properly inserted, removing any that are not.
3. Balls are dropped into the sleeves.
4. A ball tamper checks to ensure the proper number of balls is inserted into the sleeve.

5. The assembly passes through a two-stage, 48-inch-long Axon heating tunnel to heat-shrink the package.
6. The finished packages are removed from the fixtures by a dual-arm pick-and-place station and placed on a takeaway conveyor.
7. Sleeved balls are manually loaded into trays and transferred to the next packaging station.

Under program control, the machine can insert two, three, or four balls into each sleeve. Balls are continuously fed down four tubes from a gondola into holdback areas that queue up the balls.

Up to fourteen pallets can be moving through the system at the same time, achieving a production rate of 12 dozen packages per minute. Cycle time for sleeving a dozen balls (four packs of three balls) is reduced from 18 seconds to 5 seconds.

The conveyor system forms a rectangular circuit about 12 feet by 3 feet for transporting 160-mm x 400-mm aluminum pallets holding the fixtures. The long sides of the system use Rexroth 3500-mm-long BS2/K transverse conveyors with a 160-mm width. Motors are outboard mounted and drive the unit with a tooth-belt drive. 610-mm-long EQ2/T tandem-lift conveyors on the short sides of the rectangle connect the two transverse conveyors.

The EQ2/T transfers pallets perpendicularly between the parallel BS2/K conveyor sections via a reversible transverse conveyor



Four plastic sleeves are automatically inserted into the four nests of the fixture, mounted on Bosch Rexroth TSplus conveyors

and two slave-driven lift transfer units. It consists of an electrically powered belt conveyor segment and two slave-driven lift transfer units. Each of the two lift plates with toothed transfer belts is raised or lowered by a pneumatic lift cylinder. Pallets are transferred onto or off of the transverse conveyors from the raised position. In the center, or rest position, the transfer belts are located 1 mm below the bottom of the pallet. A stop bar mounted to the lift plate may be used to stop pallets on the lift plate, or inverted so pallets pass through freely. Applying air pressure to the bottom of the cylinder raises the lift plate. This lifts the transfer belts on the lift plate to a position 10 mm above the nominal conveyor height. As the lift plate rises, the transfer belts engage the pallet and transfer the pallet to or from the transverse conveyor. The lift plate may also be lowered 10 mm below the nominal conveyor height to release a pallet along the conveyor.

The EQ2/T, however, is not simply used to transfer pallets between the two long sections. One of the EQ2/T conveyors positions the fixture to receive balls into the sleeve; the second positions the packaged balls for removal from the machine.

One reason for choosing the Rexroth conveyor system was that it offered extreme flexibility in providing so many choices in configuration, pallet size, speed, and transport media. The wide range of choices allowed IDF to configure a conveyor system to the needs of the application, rather than adapt the system to the shortcomings of the conveyor. As Brian Travis explains, “We were able specify a conveyor system that was easy to configure and met our needs for performance, flexibility, and easy care perfectly.”

Travis found the Rexroth system easy to work with. The system is highly modular, comes pre-engineered,

and integrates simply. “The system goes together easily and eliminates the startup hassles of a less capable system,” says Travis.

The resulting machine is elegant in the simplicity with which it operates. It achieves the goal of packaging golf balls efficiently and practically. At this point, the system has proven reliable and solid, running 24/7 without any glitches.

An additional benefit of the TSplus design is how easy it is to maintain. The application uses a belt-drive unit; when necessary, the belt can be easily and quickly changed—meaning minimum downtime. According to engineers at Wilson, other conveyors have required major disassembly for repair.

In short, productivity is up, downtime is down, and Wilson is packaging golf balls faster than ever. That’s keeping a lot of passionate golfers happy.

Rexroth
Bosch Group