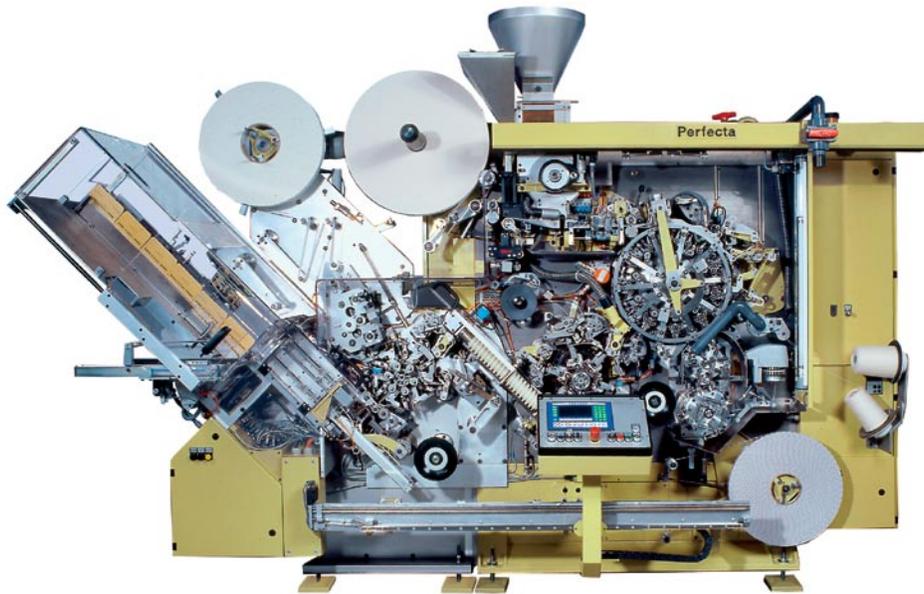


Drive & Control
profile

Rexroth Automation and Motion Control Increases Production for Tea Packaging Machine



Using a Rexroth automation system, the Perfecta can fill and produce bags at a rate of 400 per minute with thread and label, or with an outside paper protection. A highlight of the automation system is Rexroth's integrated safety technology.

The German company Teepack, a sister company of Teekanne, has developed and produced machines for the production of beverage tea bags for 60 years. With its new "Perfecta" machine and a new tubular bag machine, the company counts on automation from Bosch Rexroth.

A misconceived direct mailing in 1908 marked the beginning of a new way to package tea. In order to keep shipping costs low, tea

dealer Thomas Sullivan sent small tea samples to potential customers in New York in light silk bags instead of the customary tin

Challenge

Design a tea bag packaging machine and a tubular bag machine with the production flexibility to quickly package a wide variety of tea products

Bosch Rexroth Solution

- IndraMotion for Packaging with decentralized control and servo technology
- IndraMotion MLD
- SERCOS III
- Safety on Board integrated safety technology
- IndraMotion MLC controller

Results:

- Consistent cycle time of 0.15 seconds, or 400 bags per minute
- Performance increase of up to 20 percent
- Safety tests automatically run online in the background, creating prerequisites for continuous 24/7 operation
- Ability to control up to 64 servo drives

cans. The recipients who had no experience with the preparation of tea immersed the precious leaves in hot water together with the silk bag and thus involuntarily invented the tea bag.

In 1929, a predecessor company of the Teekanne/Teepack group in Dresden, Germany developed a fully automatic machine and invented taste-neutral materials to contain the tea leaves. After the reorganization of the company in 1948, Teepack developed a new style of tea bag, which is still typically used with premium teas today. The company also developed a fully automatic machine for the production of these bags.

Teekanne, the market leader for tea in Germany today, fills 10 million tea and herb bags every day on Teepack machines. Since its foundation, Teepack has installed about 2,500 filling machines worldwide. A variety of tea products and different flavors and packages has decisively increased on supermarket shelves. Thus, flexibility in production is more important than ever.

Rexroth controls 400 bags per minute

Teepack fulfills this production flexibility with their current machine, Perfecta. It consists of a basic machine with optional modules that can be added to fasten the thread to the bag and the label with knots, or tack them together with a metal clamp. The modules can also pack the individual bags in aroma-proof paper envelopes or heat-sealable foil



With the two machines Perfecta and Zenobia, Teepack counts on the Rexroth automation solution IndraMotion for Packaging.

depending on the requirements. Teepack includes the modules in the machine with the Bosch Rexroth automation concept [IndraMotion for Packaging](#) with decentralized control and servo technology. With this automation concept, the Perfecta consistently keeps a cycle time of 0.15 seconds, or 400 bags per minute.

All of the recipes, procedural processes, visualization and a PLC according to IEC 61131-3 standards, are saved on an industrial PC by Teepack.

Rexroth IndraMotion for Packaging with the drive-based [IndraMotion MLD](#) ensures the decentralized synchronization of the servo drives for the individual modules. It controls up to eight servo axes in real time via [SERCOS III](#) without any necessary additional hardware. The open control is based on IndraLogic,

a run time system which also corresponds to IEC 61131-3.

Numerous functionalities that are common in packaging machines are already pre-configured in the control by Rexroth via the PLCopen motion modules. “Thanks to the modular concept of the Perfecta and the modular automation structure, we can always provide the ideal machine to our customers,” says Andreas Meyering, head of electric engineering and software development with Teepack.

Safety up to date

With motion control from Rexroth, Teepack pursues a clearly defined goal. “We can activate the additional modules and necessary servo drives on the respective machine via the user interface. This reduces the variety of the software and allows for quick, subsequent integration



The drive-based IndraMotion MLC controls up to eight servo axes in real time via SERCOS III without any necessary additional hardware.

of additional modules,” says Meyering, explaining a decisive advantage. The motion control synchronizes the individual modules with the cycle of the Perfecta, and it automatically takes over format and recipe changes from the main control without any necessary additional control intervention.

A particular highlight of the automation is Rexroth’s integrated safety technology, [Safety on Board](#). It’s comprised of several certified safety functions, such as safe stop/operation stop and safe movements in the form of reduced speed, maximum torque or turning direction. The safety functions directly in the drive shorten the reaction times to below two milliseconds. With other safety solutions, a machine cycle has to be interrupted for a coercive dynamization of up to eight hours in order to detect “dormant bugs.”

Now, the tests automatically run online in the background during processing with Rexroth Safety on Board, and without any required intervention by the user. This creates the prerequisites for a continuous 24/7 operation.

Different machine— same automation

Teepack has also extended its product range with the newly developed, vertical tubular bag machine, Zenobia. The new machine fills block-bottom bags with little air inside. For automation, it uses IndraMotion for Packaging in the controller-based version [IndraMotion MLC](#), which is able to control up to 64 servo drives. With compact hardware, users can even use robotics functions via the motion control and PLC functions.

“The Zenobia is designed for continuous, as well as intermittent operation,” says Meyering. In both operation modes, the machine can produce “Air Free” bags with little air inside in one step, and thus replaces a second machine that had been necessary to utilize until now. Thanks to the continuous process, the machine



The Zenobia machine uses Rexroth’s IndraMotion MLC controller-based system which can control up to 64 servo drives, and also includes robotics.

achieves a performance increase of up to 20 percent. Additionally, the products are filled in a more gentle way so the bags have a better quality and the machine runs more smoothly. This machine is not only designed for tea packers but also for users who pack frozen food, pasta and fresh goods, leguminous plants or other food and non-food products. These capabilities are new for Teepack.

In comparison to the Perfecta, Teepack only changes the hardware platform of the automation system in order to control a larger number of servo axes. Engineering tools, the run time system and the motion modules remain the same and reduce the time required for the implementation of new concepts. "With the Zenobia, we mainly use the driving along the motion curves, as well as pressure mark and dancer controls of the IndraMotion," says Meyering. With this, the software developers can even copy program modules

that have been written between the individual machine ranges, since the Rexroth system solution uses the same software for all hardware versions. Teepack modularly includes additional units and modules in the open automation architecture, as is the case with the tea bag machines.

Open interfaces

All of the system solutions from Rexroth support connection to the most diverse control communications and automation environments with open interfaces. With the Zenobia, the user only enters the thickness and length of the bag when it is time to weld, and then the PC control uses these as a basis to calculate the optimum motion profiles of the individual axes, and sends the data to the motion control via TCP/IP. The motion controller controls the overall machine cycle with a capacity of up to 200 bags per minute. Also, Teepack uses leading,

state-of-the-art safety with Safety on Board from Rexroth.

The folding parts of the tubular bag machine adapt to the individual filling level of the bags, and thus consider variations of the filling height. The scanning of the filling height takes place during the welding of the head and/or bottom seam. The head seam, which is made by the transverse sealing jaws, is also the bottom seal of the following bag so that no projecting packaging material occurs.

With the new vertical tubular bag machine, Teepack addresses the world market as they already have with the tea bag machines. "An important advantage of Bosch Rexroth as the partner for automation is their worldwide high recognition of users," says Meyering. Thus, Teepack starts the 61st year of the company history well-equipped with innovative products.

Rexroth
Bosch Group