

The tea bag is 100 years old and popular as never before. An integrated automation solution provides flexibility for the production.

Tea quickly packed in bags

Teepack counts on automation | On its one hundredths birthday, the tea bag is popular as never before. The German company Teepack, a sister company of Teekanne, develops and produces machines for the production of tea bags since 60 years. For their current series Perfecta and a new vertical form fill and seal machine, the company counts on an automation solution of Rexroth.

A misconceived direct mailing campaign marked the beginning in 1908: in order to keep the shipping costs low, the tea dealer Thomas Sullivan sent small tea samples to potential customers in New York in light silk bags instead of the tin cans which were usual at that time. 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 the beginning, the commercial production suffered from the fact that unsuitable materials were used which adulterated the fine flavour of the tea.

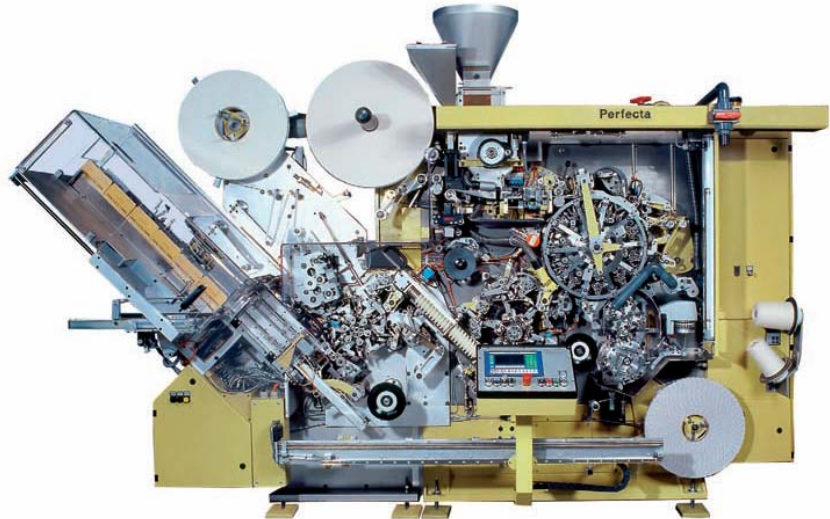
Only in 1929, a predecessor company of the Teekanne/Teepack group in Dresden, Germany, developed a fully automatic machine and invented tasteless materials for tea bags. After the refoundation of the company in Meerbusch, Germany, in 1948, Teepack developed the dual-chamber tea bag

which is still be used with premium teas today and in which the tea is washed around by the water in the best way and they also developed a fully automatic machine for the production of these bags.

Today, alone Teekanne as the market leader for tea in Germany fills 10 million tea and herb bags on Teepack machines every day. Since its foundation, Teepack has installed about 2,500 tea bag filling machines worldwide. An important trend is that the product life cycle of tea specialties continuously decreases. One look to the supermarket shelves shows that the variety of products of different flavours and packages has decisively increased. So flexibility in the production becomes more important than ever.

Decisive for you Bosch Rexroth profile

The Bosch Rexroth AG is one of the worldwide leading experts for drive and control technologies. Tailor-made solutions for the driving, control and motion of machines and installations which are used in the industrial and factory automation as well as in mobile appliances are produced under the brand Rexroth for more than 500,000 customers. As The Drive & Control Company, Bosch Rexroth develops, produces and distributes its components and systems in more than 80 countries. The company of the Bosch group generated a turnover of about 5.4 bn Euro with its about 33,000 employees in 2007.



The Perfecta produces 400 dual-chamber tea bags with thread and label or with outside paper protection per minute. (photos: Bosch Rexroth)

Rexroth controls 400 tea bags per minute

Teepack fulfils this flexibility with the current series Perfecta. It consists of a basic machine and optional additional modules which fasten the thread to the bag and the label with knots or tack them together with a metal clamp or which pack the individual bags in aroma-proof paper envelopes or heat-sealable foil, depending on the requirements. Teepack integrates the modules into the machine with the automation concept IPC and IndraMotion for Packaging with a decentralised control and servo technology. Thereby the Perfecta consistently keeps the cycle time of 0.15 seconds.

All recipe data, procedural operations, the visualisation and a PLC according to IEC 61131-3 are stored on an industrial PC by Teepack. The synchronisation of the servo drives for the single

modules is done in a decentralised way by IndraMotion for Packaging with the drive-based Motion Control IndraMotion MLD. It controls up to eight servo axes in hard real-time via SERCOS III without any additional hardware being necessary. The open control is based on IndraLogic, a runtime system which also corresponds to the IEC 61131. Numerous functionalities which are common in packaging machines are already pre-configured in the control by Rexroth via the PLCopen motion blocks. "Thanks to the modular concept of the PERFECTA and the modular automation structure, we can always provide the ideal machine to our customers," emphasizes Andreas Meyering, Head of Electric Engineering and Software Development at Teepack.

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Safety up to date

With the Motion Control of Rexroth, Teepack pursues a clearly defined goal: "Already in our plant, we activate the actually physically present additional modules and necessary servo drives of the respective machine from the complete standard program via the user interface. This reduces the variety of software and allows a quick subsequent integration of additional modules at the endcustomer'," says Andreas Meyering, explaining a decisive advantage. The Motion Control synchronises the individual modules with the cycle time of the Perfecta and it automatically takes over format and receipt changes from the main control without any additional control interventions being necessary.

A particular highlight of the automation system: the integrated safety technology "Safety on Board". It comprises of numerous certified safety functions such as safe stop/operating stop and safe movements in the form of limited speed, maximum speed or monitored direction. The safety functions directly in the drive shorten the reaction times to less than 2 milliseconds. While with other concepts, a machine cycle has to be interrupted for a forced offline-checking-procedure at the latest every 8 hours in order to detect "dormant faults", with Rexroth "Safety on Board" the tests run online in the background automatically during process-

ing and without any user intervention being required. This establishes the prerequisites for a continuous 24/7 operation.

Different machine – same automation

With a completely newly developed machine range, the vertical form, fill and seal machine "Zenobia" for the filling of block bottom bags with minimal air content, Teepack has extended its product range. Here also, the packaging expert uses the IndraMotion for Packaging for automation, but in the controller-based version MLC which is able to control up to 64 servo drives. On a compact hardware, the user can realise even robotics functions via the Motion Control and PLC functions.

"The Zenobia is designed for continuous as well as for intermittent operation," underlines the Head of Electric Engineering and Software Development. In both operation modes, the machine is able to produce "Air Free" bags with minimal air inside in one step and thus replaces a second machine which has been necessary until now. Thanks to the continuous process, the machine increases performance of up to 20%, the products are filled in a more gentle way, the bags are of better quality and the machine runs smoother. New with Teepack: the machine is not only designed for tea packers but also for endusers who pack frozen food, pasta, fresh food,

legumes or other food and non-food products.

In comparison to the tea bag packing machine, Teepack only changes the hardware platform of the automation system in order to control a larger number of servo axes. Engineering tools, the runtime system and the motion blocks remain the same and reduce the time required for the implementation of new concepts. "For the Zenobia, we mainly use motion profiles as well as the print mark registration and the dancer control of IndraMotion," says Andreas Meyering.

In doing so, the software developers are even able to copy once written programme modules between the different machine types since the Rexroth system solution uses the same software for all hardware platforms. Teepack modularly includes additional units and modules into the open automation architecture as they do with the tea bag packing machines.

Open interfaces

All Rexroth system solutions support connection to most of the different control communication and automation environments via open interfaces. With the Zenobia, the user only enters the size and the length of the bag and the welding time, and the PC control then uses these as a basis to calculate the optimum motion profiles for the individual axes and sends the data to the Motion Control via TCP/IP.



On both machine types Perfecta and Zenobia, Teepack relies in the Rexroth automation solution IndraMotion for Packaging.

controls the overall machine cycle. With this, the machine reaches a capacity of up to 200 bags per minute. On the Zenobia Teepack also uses the leading state of the art "Safety on Board" by Rexroth

Besides block bottom packages, the enduser can produce conventional flat bags as well as stand-up bags on the machine. The "AIR FREE system" additionally disposes of a "density control".

The folding parts of the vertical form, fill and

seal machine adapt to the individual filling level of the bags thus considering variations in the filling height. The scan of the filling height takes place during the sealing of the top/bottom seal. The top seal, formed by the cross sealing bars, is at the same time the bottom seal of the following bag, so no unused packaging material occurs.

With the new vertical form, fill and seal machine, Teepack addresses the world market as the company already did with

the tea bag machines. "An important advantage of Rexroth as our partner for automation is their worldwide high acceptance at the endusers," Andreas Meyering points out.

So Teepack starts the 61st year of their company history well equipped with innovative products.